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VIEWS, NEWS AND INTERVIEWS.

The first telephone in any section of the country is thus described by a citizen of Northampton, Mass.: "A little more than 50 years ago the employés of the Arms Shoe Manufactory, at South Deerfield, beguiled their leisure hours by kite flying. Kites large and small went up daily, and the strife was to see who could get the largest. The twine which held them was the shoe thread spun and twisted by the ladies of the village. One day to the tail of the largest kite was attached a kitten, sewed in a canvas bag with a netting over the mouth to give it air. When the kite was at its greatest height, some 200 feet or more, the mewing of the kitten could be distinctly heard by those holding the string. To the clearness of the atmosphere was attributed the hearing of the kitten's voice."

Washington despatches say that Postmaster-General Wanamaker, in his next annual report, will urge the adoption of postal telegraphy and one-cent letter postage.

A short time ago one of the leading provincial supply companies engaged an ex-telephone hand to assist in the engine room, says London *Lightning*. One night there was an accident at a certain point in the street mains, blowing out one of the double pole main fuses under his charge. The poor youth was very conscientious, though not too well versed in his trade. He entered with painful accuracy in the report, "*Half* a short circuit on No. 2 main at 9.30 P. M.!"

A league is in process of formation in France for the association of all those towns where gas is more than a certain amount (0.20f. per cubic metre) to press for reduction, reform and the introduction of electric light.

The Mount Washington signal and search-light has been outdone in one capacity by the electric apparatus with which experiments have been made at Earl's Court. The managers have succeeded, not only in throwing the distinct forms of gigantic letters upon the clouds, but they have even made the well known features of Mr. Gladstone appear in ghostly outlines in the heavens.

Among the odds and ends at the museum of the College of Surgeons is a suit of clothes with a curious history, says an English exchange. Three men took shelter from a thunderstorm under a pollard willow. A flash of lightning struck the tree and took in one man. It did not injure him in the least, but threw him down, and violently stripped off his clothes, which were hurled a distance of 20 yards. The explanation given is that the clothes were stripped from the man by lightning just as bark is stripped from a tree. The discharge finds a moist passage down between the bark and the trunk, converting the moisture into steam, and thus blowing off the bark. It is supposed that the man's clothes had become drenched by rain, and by a similar generation of steam, there had been an explosion severe enough to rend his things from him and throw him to the ground. Fortunately for him, his wet clothes had formed a better conductor than his own body.

The official announcement of the Edison Electric Illuminating Company, of Boston, notifying all users of the incandescent lamp that by decision of the court Thomas A. Edison is the original inventor, and that all sale or use of any incandescent lamp in Boston without consent of this company is prohibited, etc., has been made.

The Thomson-Houston Electric Company has purchased a large tract of land in Peabody, Mass., on which it proposes to erect dwelling houses for the use of its employés at West Lynn. An effort will also be made to have the Lynn and Boston Street Railroad Company reduce its fare from ten to five cents between Lynn and Peabody. The company has also procured land at Pleasant Hills for the same purpose as in Peabody.

In order to avoid the possibility of explosion while "rummaging" for contraband goods on board tank and other vessels carrying petroleum or explosives, the English custom officers are in the future to be supplied with electric lamps of special pattern. Ruby colored lights for the examination of imported cases of photographic plates in a dark chamber are also to be supplied to prevent the ruining of the films.

The price of platinum is to-day lower than it has been since the introduction of the incandescent lamp. This is gratifying to the manufacturers of these lamps, and it would seem to indicate that the rumors about the exhaustion of the supply of platinum are unfounded.

FIG. 1.—MR. JOHN JACOB ASTOR'S NEW ELECTRIC LAUNCH "CORCYRA."—(See Page 188.)

Telephone vs. Electric Railway.

The development and perfection of methods of telephonic communication will in all probability be materially hastened by the decision of the Court of Appeals in the case of the Hudson River Telephone Company against the Watervliet Turnpike and Railway Company, of Albany, which was made public a few days ago. The nominal parties to the suit are of local importance only, but behind them were two of the largest electrical companies in the United States, and vast interests were involved in the suit. The American Bell Telephone Company was behind the plaintiff; the real defendant was the General Electric Company, of this city. Hence the suit was practically a test case and the decision will, therefore, probably put a quietus on all pending or contemplated litigation of the same kind. Justice Maynard's decision reviews and analyzes the contentions of the parties to the suit at considerable length. It holds that the telephone company's claim to protection on the ground of the erection of its line prior to the building of the trolley line in the streets occupied by both is untenable. Public highways are primarily designed to facilitate traffic and inter-communication, it declares. And as the trolley system, according to the testimony in the case, is apparently the most desirable means of street car propulsion now known, is hence advantageous to the traveling public and was legally introduced by the Watervliet Turnpike and Railway Company, the courts would have no power to terminate its employment unless the plaintiff corporation could lay claim to some superior right to the use of the streets. This it could not and did not do, and hence, the decision says, although it is apparently admitted that the more powerful currents transmitted through the rails of the trolley road, and thence communicated by induction to the grounded telephone wires, did interfere with their operation of these wires, the telephone company cannot compel the trolley company to abandon its plant. The testimony in the case shows that the telephone company can prevent the interference by using metallic circuits instead of "grounding" its wires, and, in the judgment of the court, this is its only resource.

LIGHT AND POWER STATIONS.

SOME HINTS TO OWNERS AND OPERATORS BY A PRACTICAL ENGINEER.

A Growing Tendency Toward Large Units—Properly Proportioned Units Are True Economy—A Concrete Example of Badly Arranged Units—Foresight Is Better Than Hindsight.

BY ROBB MACKIE.

XI.

The growing tendency of these days is to large units, both of engines and dynamos, and while not for one moment questioning the necessity for this, and the advisability of having such large units, but, on the contrary, fully endorsing them for their proper field, one must not overlook the "proprieties," as it were. Don't, therefore, for the sake of having the "very latest" machinery, overlook the advantages of having units both of engine and dynamos in your station that are perfectly adapted to the character of the work to be done and the loads to be carried. In this proper proportioning will be found the true economy of operation. This proportioning of the units to the load, both present and prospective, is one of the more difficult of the tasks allotted to the engineer, and requires a careful weighing of conditions in the light of past experience to determine the best sizes to adopt for any given plant.

One illustration of this will be enough to point the moral and attract the attention of the thinking manager to this important subject, and while this illustration deals with one of the larger of our central stations, the facts are equally applicable to the smaller ones.

Some years ago, a party of capitalists decided to build a mammoth electric light station. All the points were carefully discussed by these gentlemen, who were all very successful business men, and after having arranged the political features of the undertaking they employed a very eminent mechanical engineer to take charge of the work. After a due period of careful attention, he presented his plans, which were accepted.

These embraced a magnificent building, complete in every appointment, a superb steam plant of the most approved type of boilers, engines and all the necessary adjuncts in every particular, and a general plan for the dynamo rooms and necessary shafting and pulleys to drive the dynamos.

The building was half completed and all of the steam plant and shafting contracted for and half built before the projectors could determine which electrical system to place therein, and then the contract was made for the electrical plant. When the plans were submitted to the electrical engineer who was called upon to build and instal this machinery, a more thoroughly disgusted man would have been hard to find. For a time he point blank refused to have anything to do with the work unless radical changes in the requirements for the electrical plant were made, arguing, rightly, that he would be held responsible for the successful operation of the plant, and therefore would have all the blame to bear for the failure he felt sure would follow an installation on the plans laid down. These contemplated the use of numerous small units of dynamo driven by large engines by means of the shafting and pulleys.

Again and again he repeated the request that he be allowed to design and build dynamos with a capacity of from 5,000 to 6,000 lights (this was in the days before the "kilowatt" had come into use as a term to designate dynamo capacity) as a suitable unit for such a station. But, incredible as it may seem in the light of present large generators, he was laughed at as "visionary" and as having no appreciation of the "necessities" and "difficulties" in the case in point. The mechanical engineer, on the other hand, "knew all about it" and had his own way, and the "visionary" electrical engineer, with all of his "grand schemes" and "too advanced ideas," was "knocked out," and the plant installed to meet the view of the mechanical man. As this was an alternating current plant, it will be understood that this use of a large number of small dynamos required a corresponding number of circuits, and that to secure the necessary interchangeability between circuits and dynamos, a switchboard was necessary which was clumsy and unwieldy and required the constant attendance of two men to operate it properly.

There is hardly another plant in operation to-day that has been more troublesome or expensive to operate, and that has caused so many "wakeful nights" to its various managers. When the load is light, the large engines have a tendency to irregular operation, resulting in bad service, to say nothing of the lack of economy in operation, while when the full load is on and the engines are working to capacity, and at an economical point it is necessary, in case of trouble with an engine, to transfer the circuits from eight dynamos to eight others, on another engine, and as this takes considerable time there is very apt to be an interruption of service upon some one or more of the circuits, with all of the attendant evils of such interruption.

The use of small dynamos necessitated the arrangement of circuits so that only about 1,000 lights could be connected on each set of "feeders" with a reasonable loss. This condition would have been hard enough to handle at best, but owing to what were claimed to be "unforeseen conditions" that arose before the plant was started it was necessary at times to carry from 1,500 to 1,800 lights on each set of "feeders," resulting in a condition that made successful operation almost impossible.

In spite of most earnest protests these conditions were forced upon the electrical engineer by the mechanical engineer, who had designed the plant and who had the ear of the owners.

The result of this piece of work is that after three years of operation at a dead loss it was decided to replace all of the small units with large ones and carry out the suggestions made by the electrical engineer at the time of his first inspection of the plans, to put in 5,000 or 6,000 light dynamos, with switchboard and "feeders" to correspond. The result of this change has proved conclusively that his plan was a perfectly feasible one, and had it been carried out at the first, instead of at the latter day, we should have had large dynamo units in operation in this country at as early a day as our European brethren, and this particular company would have saved many thousands of dollars.

Owing to the conditions existing in this station under the original arrangement, the economies of the various parts were always working at cross purposes, as it were, for when the full load was on and all machinery was in operation the engines were working at the highest point of efficiency, while owing to the overloading of the "feeders" there was a loss of at least 45 per cent. in operating over them. A condition that would hardly be warranted even in using a *free* water power with no cost of operation beyond a single attendant. On the other hand, for three-quarters of the time the load was so light that the single engine was operating at very low efficiency; at the same time the interest on the investment was going on just the same as though the plant was in full operation.

The proper arrangement for this station was to have the greater part of the load carried by large engines and dynamo, but, with a sufficient number of small units, both steam and electrical, to conveniently and economically handle the smaller loads during the hours they were on the station. Furthermore, to have sufficient copper in the circuits, to have a loss that would be reasonable during the hours of heavy load, and within the range of the economical construction of an automatically regulating dynamo.

Had these various points been considered at the outset, instead of blindly following the advice of the mechanical engineer, who no doubt was thoroughly posted as to steam plants and building, but was away out of his element when dealing with the electrical problem, many good dollars which were paid for rebuilding and which were eaten up by uneconomical operation, would have found their way instead, as dividends, into the pockets of the stockholders.

Truly, the old countryman was right, when he said, "You bees right, stranger, in the way you look onto these things, but then you know hindsight was allers a heap more ackerit than foresight, but, unfortunately, we can never be beforehand with the hindsight."

A Corkscrew Electric Railway.

In Midway plaisance, just outside the Exposition grounds, the World's Fair Tower Company will erect an odd and striking structure. The tower will not be remarkable for its height, for it is to be only 560 feet tall, but for the peculiar method of getting to the top of it. This tower is something in the form of a corkscrew, surrounded by uprights of steel. It consists of a winding track leading to the top, the track being supported by steel columns.

It is not intended to use elevators in making the ascent, but instead, cars propelled by electricity will take the passengers up. Near the top is a landing place in the form of a floor that extends entirely across the tower, which is 200 feet in diameter. Here passengers will alight. From this landing place they can get a fine view of the grounds. The company has secured its site and will soon begin work on the tower.

It is stated that the Russian Government is about to purchase the telephone system.

Mr. Astor's Electric Launch.

ELECTRIC POWER SUCCESSFULLY ADAPTED TO PROPELLING PLEASURE CRAFT ON NEW YORK WATERS.

The "Corcyra," the ancient title of one of the Ionian Islands, is the euphonious name given by Mr. John Jacob Astor to his new and handsome launch which was recently completed and which is the first constructed for private use on the waters of the Hudson river and New York bay. It is operated by an electric motor supplied with current from storage batteries. Mr. Astor has been an interested observer and student of electrical progress for several years, and decided, in view of his pleasant experience with electric launches on the Thames, to have one built for his own use from his residence at Rhinecliff-on-the-Hudson.

Mr. J. C. Chamberlain, the well-known electrical engineer of New York, directed the work for Mr. Astor, and had the launch built by the General Electric Launch Company, the owners of the Brush storage battery rights for launch purposes.

The "Corcyra" was first tested in New York bay on the morning of the naval parade, October 11, by Mr. and Mrs. Astor, and both were greatly pleased with the graceful lines of the launch and its particularly easy manipulation.

The launch is now at Mr. Astor's private dock, north of Rhinecliff, N. Y., where it is in daily use. It is charged by a temporary plant specially erected at one of the machine shops at Rondout across the river, but a permanent plant is to be installed on the dock. So pleased is Mr. Astor with the working of this launch, every detail of which he has become familiar with, that he has decided to build another for use with his steam yacht, the "Nourmahal," the largest private yacht in the world. As the "Nourmahal" carries its own electric lighting plant, this launch can easily be charged while hanging from the davits.

A description of the "Corcyra" is given in full below and will undoubtedly prove of special interest to the yachtsmen of this country, who have long been looking to electric power for assistance in this field. The hull was made from designs of Messrs. Gardner & Mosher, naval architects, and is constructed of mahogany, the entire panelling and deck being also of mahogany. It is 37 feet over all and 31 feet 6 inches on the water line, with a beam of 6 feet 2 inches, and a draught of 18 to 20 inches. The launch is handsomely finished, the floor carpeted, and the seats supplied with leather cushions, partly filled with cork, which can serve as life preservers in case of any accident.

The deck plan, Fig. 2, shows the great seating capacity of the launch, which will easily accommodate 25 persons, and also the location of the motor, which is of about 4½ horse-power.

The batteries, 70 in number, are placed under the seats and on either side of the motor, as shown in the illustration, Fig. 2. With a full charge in the batteries the launch can make a continuous run of from 60 to 70 miles, at a constant speed of five miles an hour. Very much higher speed can be obtained for shorter distances from this electrical equipment. In fact, trials have shown that this launch can travel at a rate of nearly 11 miles an hour.

The operation of the boat is exceedingly simple. It is controlled by a small lever switch at the side of the wheel, which is located in the forward part of the launch. This lever allows of four different rates of speed, namely, three, five, seven and ten miles per hour. To insure perfect contact, mercury cup switches operated by magnets are used.

Particularly noticeable features are the noiselessness of the motor, and the absence of any vibration, except under the highest speed.

The lines of the launch are so perfect that it travels through the water very smoothly and leaves no waves, as will be observed in Fig. 1, which is produced from an instantaneous photograph taken while the launch was under way.

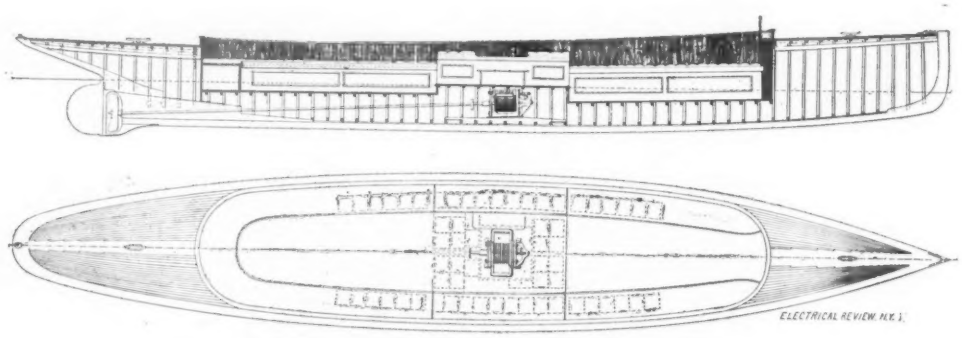


FIG. 2.—DRAWINGS FOR MR. JOHN JACOB ASTOR'S NEW ELECTRIC LAUNCH "CORCYRA."

An Electrical Wedding.

There was a wonderful electrical display at the wedding of Miss Lydia Miller and Mr. David Rosenbaum, in Baltimore, recently. After the marriage ceremony had been completed the bride and groom took their positions against a background of potted plants and flowers set against a screen of evergreens; tiny incandescent electric lamps were concealed in the foliage of the screen, and glowed and disappeared irregularly like fireflies in among the trees. Electrical butterflies and birds perched among the leaves and flowers. Overhead was a crown of Chinese lanterns, each containing a 16-candle power lamp. The bridal arch of evergreen, under which the newly married pair stood to receive their friends, was provided with a row of electric lamps in red, white and blue. On top of the arch was perched an American eagle, and on the shield of pink velvet, which formed the keystone of the arch, was outlined in incandescent lights the figure of a heart, the initials of bride and groom, and the date 1892. Two bronze statues stood guard at the entrance of the room, and their helmets were illuminated by incandescent lamps.

The electrical wonders did not stop here. The most ingenious feature of this unique wedding reception followed in the scattering of a shower of rice and imitation snowflakes by two electric fan motors placed in the gallery overhead. As the guests entered the supper-room there was a sudden outburst of electric bells and musical entertainments. As the guests were seated there was a blaze of light, and at the completion of the first course the words "Good luck" appeared over the heads of the newly-married couple and an electric hairpin, a gift to the bride, became incandescent and surrounded her head with a halo of light. Wine bottles were suddenly transformed into glowing candelabra. The feast was one long continued series of electrical surprises, and however the guests at ordinary weddings feel, the guests at this wedding must have thought that they were amply recompensed for their outlay in wedding gifts.

The new electric railway between Attleboro, Mass., and Pawtucket will be in operation before many weeks.

The First Electrolier.

We have received the following communication from Messrs. B. Verity & Sons, King street, Covent Garden, London, well-known artificers in brass and electric light engineers and contractors:

To the Editor of Electrical Review:

In view of the forthcoming exhibition at Chicago, may we ask your permission to state that the celebrated electrolier originally manufactured by us for Mr. Edison's well-known exhibit at the Crystal Palace, 1882, has recently again come into our hands for sale?

It may be interesting to your readers to know that this is the first fixture to which the word "electrolier" was applied, and it is in this and other respects a noteworthy curiosity, as it is one of the largest pieces of hand wrought floral work that has ever been manufactured. It stands about 16 feet high and is 10 feet broad, has 99 lights in three circuits, and originally cost over £350. It is now to be sold for £75, the metal alone in it being of considerable value.

Perhaps some of the prominent companies who propose making brilliant shows at Chicago might feel disposed to utilize it "as the first electrolier that ever was constructed."

Yours faithfully,

B. Verity & Sons.

London, October 21, 1892.

Messrs. Verity & Sons' electrolier is shown in Fig. 2. While this is a very interesting example of early electric fixture designing, a beautiful specimen of metal working and possibly the first fixture to which the word "electrolier" was applied, it certainly is not the first electrolier constructed. According to the above letter this fixture was made in 1882.

In the Electrical Review for November 21, 1891, page 184, appeared an article entitled "Ancient and Modern Electroliers." The first illustration in that article was the one reprinted herewith as Fig. 1. The title under the cut stated that it was "the first electrolier," and the following paragraph explained it:

"This was a gas fixture purchased from Mitchell, Vance & Company, of New York, in 1880. It was taken to the residence of Mr. Francis R. Upton, at Menlo Park, N. J., and wired there. Each of the six arms had attached to it at its outer end a cross-bar from each end of which depended an incandescent lamp. The flexible wires, red for positive and blue for negative, were wound about the exterior of the fixture. In the light of modern times, this is certainly a crude affair, but like all first efforts, it is of great importance. Mr. Upton presented this historic electrolier to Mr. Luther Stieringer, whose property it now is. Mr. Stieringer intends to place it with his large collection of early electrical appliances as soon as a suitable place can be provided for their permanent preservation and exhibition."

Fig. 1.—The First Electrolier.—The Stieringer Fixture.

So it will be seen that Mr. Stieringer's fixture antedates the Verity electrolier by about two years. Whether Mr. Stieringer called it an "electrolier," we cannot say. It is probable that this fixture will be exhibited at the World's Fair with Mr. Stieringer's large collection of electrical apparatus and relics.

The Verity electrolier is certainly more artistic than the earlier one and is doubtless "the first *English* electrolier that ever was constructed."

World's Fair Souvenirs.

How you can get one of the Columbian half dollars.

The World's Fair souvenir coins are "going like hot cakes," and those who want to get one or more of them will have to bestir themselves or they will be too late. The desire for one of these mementos of the exposition seems to be almost as universal as is the interest in the exposition itself, and orders for them have been sent in from all parts of the United States and also from foreign countries.

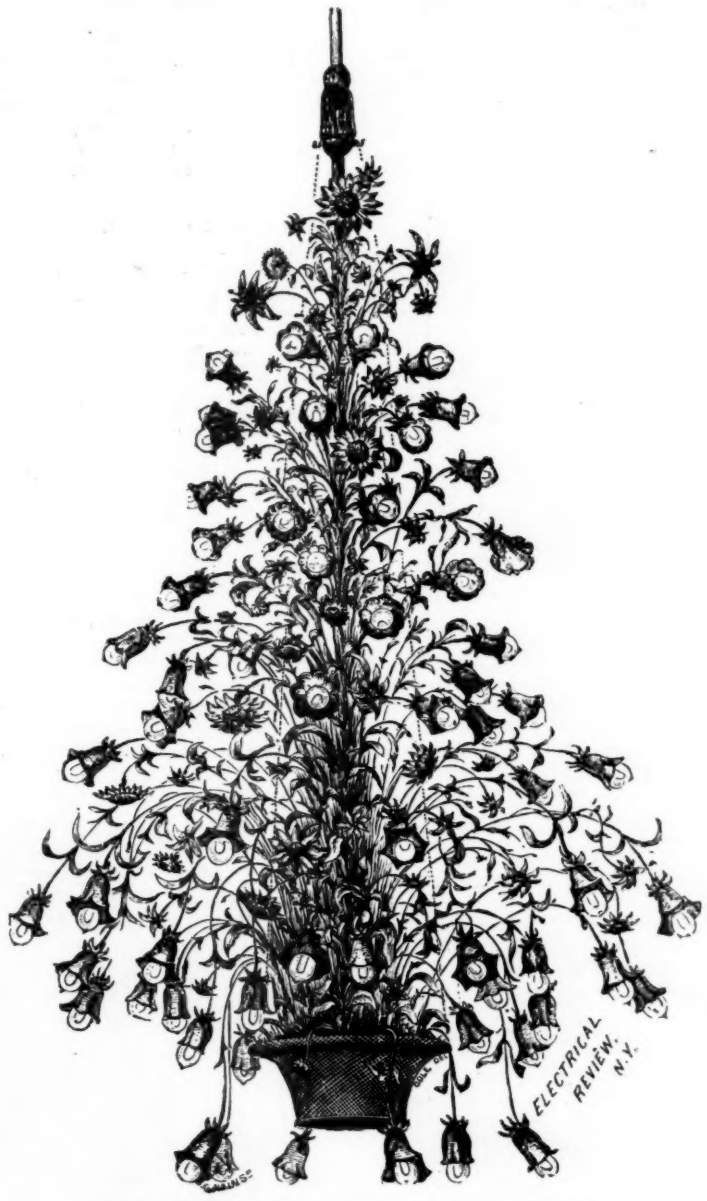


Fig. 2.—The First Electrolier.—The Verity Fixture.

This souvenir half dollar, it is reported from Washington, will be the most artistic coin ever issued from the mint. On the obverse side will appear the head of Columbus, designed from the Lotto portrait, and surrounding it the words, "World's Columbian Exposition, Chicago, 1892." On the reverse side will appear a caravel, representing Columbus' flag-ship, and beneath it two hemispheres. Above the caravel will be "United States of America," and beneath the hemispheres, "Columbian Half Dollar." There is no doubt that this coin will be regarded as the most distinctive and highest prized cheap souvenir of the World's Fair.

All of these souvenir coins, except five, are being sold at a uniform price of $1 each. For the first coin struck off $10,000 has already been offered, and various prices have been bid for the 400th, 1492d, 1892d and the last coin. Desiring that these souvenirs be distributed as widely as possible among the people, and that all, irrespective of locality, have an equal chance to obtain them, the exposition authorities have sought to prevent syndicates and others from purchasing large quantities and thus "cornering" the sale. On the contrary, they have arranged to supply banks, business houses and individuals in all parts of the country with as many as they may desire to distribute among their patrons, customers or friends. They require only that the orders must be for 50 coins, or some multiple of 50, and that the order be accompanied by the cash, at the rate of $1 for each coin. A great many banks and business firms have gladly complied with these conditions and ordered each from 50 to 20,000 of the coins.

Notwithstanding these conditions have been widely published, still a vast number of inquiries by letter has been received at exposition headquarters asking how the coins may be obtained. The best way is to get them through local banks, all of which are no doubt willing to accommodate in that way their patrons and the residents of the city or town in which they are doing business. If, however, for any reason it is desired to obtain them otherwise, the proper method is to form a club of subscribers for 50 coins, or some multiple of 50, and select some one member of the club to send on the order and money and to distribute the coins when received. Orders should be addressed to A. F. Seeberger, treasurer World's Columbian Exposition, Chicago.

Is is probable that the coins will not be ready for distribution until some time in December. But the orders are being sent in rapidly and will be filled in the order of being received. Therefore, it is important that all who desire coins should put in their orders as soon as possible.

American Institute of Electrical Engineers.

At the monthly meeting of council, held at 12 West Thirty-first street, New York, October 25, the following associate members were elected:

Bion J. Arnold, consulting engineer, General Electric Company, 4128 Prairie avenue, Chicago, Ill.

Herbert D. Jeffery, secretary and treasurer, Crocker-Wheeler Electric Company, 430 West Fourteenth street, New York city.

Julius Meyer, consulting engineer, North American Company, Mills building, New York city.

F. S. Pearson, chief engineer, West End Street Railway Company, 439 Albany street, Boston, Mass.

George Jarvis Spencer, electrician, The Yale and Towne Manufacturing Company, Stamford, Conn.

Walter H. Tapley, electrician in government printing office, care of public printer, Washington, D. C.

Gurdon C. Van Buren, electrician, 5 Wilson street, Albany, N. Y.

Geo. S. Wallace, telegraph office manager, Chesapeake and Ohio Railway Company, Box 214, Clifton Forge, Va.

Norman R. Weaver, superintendent of repair department, General Electric Company, 173-5 Adams street, Chicago, Ill.

The following associate members were transferred to full membership:

Clayton W. Pike, Jas. W. Queen & Company Philadelphia, Pa.

Jas. D. Bishop, electrical expert, J. A. Roebling's Sons Company, 345 West Thirty-fourth street, New York city.

E. T. Barberie, electrician, Safety Insulated Wire Company, 234 West Twenty-ninth street, New York city.

Richard O. Heinrich, electrical engineer, Weston Electrical Instrument Company, Newark, N. J.

Frank B. Rae, electrical engineer, 27 Cleland building, Detroit, Mich.

At the meeting of the Institute in the evening the three electric railway papers read at the Chicago meeting in June were discussed. The titles of the papers are as follows: "Series Electric Traction," by Mr. Nelson W. Perry; "A New System of Electric Propulsion," by Mr. H. Ward Leonard; "Electric Railway and Motor Tests," by Prof. Geo. D. Shepardson and Mr. E. P. Burch. The discussion was opened by Dr. Cary T. Hutchinson and continued by Messrs. Sprague, Mailloux, Hewitt, Emery, Crocker, Leonard and others. The report of the committee on units and standards was accepted and referred to the subcommittee on provisional programme for the international electrical congress of 1893.

The seventy-first meeting will be held at the headquarters of the Institute, Tuesday, November 15, at 8 P. M.

The paper presented by Dr. J. B. Williams, at Chicago, in June, will be brought up for discussion, as announced at that meeting. The title of the paper is: "Oil *vs.* Air as an Insulating Medium."

The paper is printed in the July and August issue of the Transactions, p. 601, and copies will be distributed at the meeting. The author will make actual tests, showing the relative merits of the insulating qualities of air and oil, after which the paper will be discussed.

Tests will also be made of samples of various kinds of insulated wire. As the object of these tests is to show the comparative merits of all kinds of insulations, members are especially requested to send to the secretary in advance of the meeting, and as soon as possible, such samples of all the kinds of insulated wire they can procure, also samples of insulating materials, such as mica, vulcanized fibre, ebonite, etc., for comparison with oil and paraffine. These samples will be designated by numbers, and no names of manufacturers will be used in connection with these tests. The samples of wire should be about four feet in length, small sizes preferred, and the insulating materials in sheets about two inches square and $\frac{1}{16}$ inch thick, if possible.

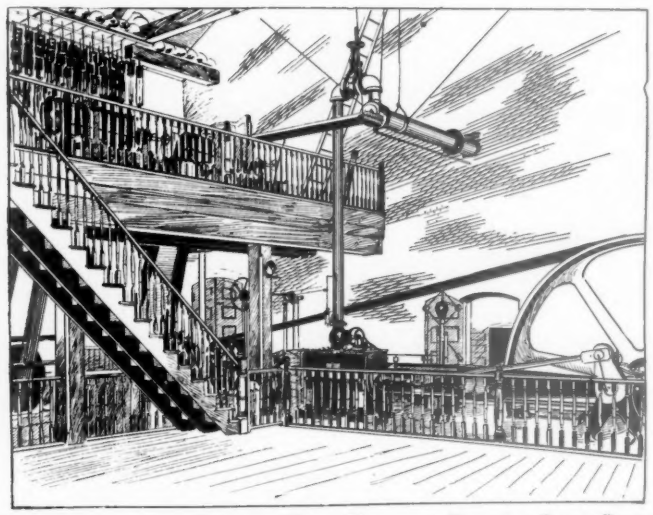
Hello! Central.

The *American* thinks the Chester telephone "Central" more arbitrary than the Czar of Russia. Our contemporary wished a person who had a penchant for eloping with telephone girls would visit Chester. For our own part we find the girls all O. K. They are polite, prompt, cheerful, and, we believe, graceful.—*Chester, Pa., News.*

The Peabody, Mass., Electric Plant.

THE FIRST STATION BUILT UNDER THE NEW MUNICIPAL LIGHTING LAW.

The town of Peabody, Mass., has just completed an electric light plant which is the first in the State to be built under the new municipal gas and electric lighting law. The plant has cost the town about $50,000. Of this amount, $40,000 will be provided for by 30-year bonds, and the rest has already been paid. Whether Peabody can run an electric plant cheaper and more satisfactorily than a private corporation remains to be seen. The law was passed with the idea that this could be done, and Peabody had the nerve to take the first chance.



INTERIOR VIEW OF THE PEABODY, MASS., MUNICIPAL ELECTRIC LIGHT PLANT.

The plant is located near a pond, from which water can be drawn for condensing purposes. The Salem and Lowell Railroad tracks are in close proximity, so that a special track can be laid for the carrying of coal. The chimney is 12 feet square at the base, has a five foot core and is 125 feet high. The station building is 80x50 feet, one story in height, with a pitch roof. The mill type of construction has been followed out, with walls 20 inches thick and 23 feet stud, hard pine trusses, slated plank roof, three inch plank floor, with a top floor of maple, and over 20 windows with arched tops. The engine and dynamo room is about 50 feet square and is separated from the boiler room by a brick partition wall.

A 150 horse-power Green non-condensing engine supplies the power for the shafts and pulleys, whose bearings are supported by stone piers from the ground on the side opposite the entrance. Over these pulleys and shafting, and extending across the room, lengthwise with the building, is a balcony 12 feet above the floor, 18x50 feet in size and of sufficient capacity for 12 dynamos. At present the balcony contains four dynamos connected with the shafting below, each with a capacity of forty-eight 1,200 candle-power arc lamps.

The town is wired in four sections, every part of the territory being covered, except West Peabody, and they are so apportioned as to be able to furnish commercial arc lighting in any part of the town. From these four dynamos the wires run to a switchboard, by means of which either dynamo can be made to run any circuit. Means are provided to test the lines daily to see if they are in working order before the dynamos are started, and meters register the amperes of current used on each circuit. Only 135 lights are now in use, but more territory is lighted than ever before by oil lamps. As the dynamos have a capacity for 57 more lamps, there is considerable chance to extend the service. The walls of this room are painted white and the woodwork left its natural color.

A step down from the dynamo and engine room takes the visitor to the boiler room, where are located two boilers of 125 horse-power each. They connect with the chimney by means of a wrought iron smoke flue large enough to accommodate another boiler of the same size. In the corner of the room is a steam pump with a capacity double its present needs, a feed-water heater of 200 horse-power and a muffler on the exhaust steam outlet.

A Kelley back-pressure valve enables the building to be heated with the exhaust steam. A Howe platform scale is built into the cement floor for the weighing of coal. The recording gauge, clock and steam gauge and other necessary indicators are on the walls of the engine room. The walls of the boiler room are whitewashed and the piping covered with packing.

The people who furnished the materials and did the work are, in part, as follows:

Architect and consulting engineer, H. M. Parker, associated with the American Tool & Machine Company, of Boston.

Boilers and setting, Roberts Iron Works Company, of Cambridgeport, Mass.

Engine, Providence (R. I.) Steam Engine Company.

Poles, lamps, lines, dynamos and all electrical apparatus, General Electric Company, of New York.

Piping and plumbing, E. G. Kelley, of Peabody.

Shafting, American Tool and Machine Company, Boston.

Belting, A. H. Whidden, Peabody.

Pipe casings, H. W. Johns Manufacturing Company, Boston.

Heater, Jacobs Feed Water Company.

Pump, Davidson Steam Pump Company, Boston.

Injector, Geo. H. Little, Peabody.

Damper regulator, Smart & Spencer, Salem.

Steam gauges, clock and recording gauge, Crosby Steam Gage Company, Boston.

TELEPHONE CHAT.

The telephone plant at Decatur, Ill., is being reconstructed.

The Pennsylvania Telephone Company has increased its capital stock from $500,000 to $600,000.

The long distance telephone line between Portland and Farmington, Me., has been put in operation.

The telephone line from Cambridge Junction to Burlington, Vt., has been completed as far as Jericho Centre.

A telephone exchange is to be established in Lancaster, N. H., connecting that town with Stewartstown, Colebrook, Groveton, Gorham and Berlin.

In about two weeks Lancaster will be connected with Danville, Ky., by telephone, which gives a circuit that will take in Lexington, Harrodsburg and Nicholasville.

The New England Telephone Company has connected the line between Rutland and Vergennes, Vt., which completes the telephone line from Burlington and Boston.

The new Pawtuxet Valley Exchange recently put in by the Providence Telephone Company at River Point, R. I., is greatly appreciated by the merchants throughout the State, and is giving first class service. Thomas H. O'Neil is in charge.

The Erie Telephone Company's sub-companies made a net gain of 298 subscribers for the three months ending September 30. Total number connected, 14,787. The executive committee of the company met on October 28 and recommended the usual quarterly dividend of one per cent.

The output of the American Bell Telephone Company, for the month ending October 20, was as follows:

	1892.	1891.	Inc.	Dec.
Gross output.....	7,434	5,272	2,166	
Returned.....	3,944	4,224	....	280
Net.....	3,490	1,048	2,442	
From Dec. 20, 1891, to Oct. 20, 1892:				
Gross...	79,519	58,590	21,229	
Returned.....	45,944	35,573	10,371	
Net.	33,875	23,017	10,858	

New England Telephone and Telegraph Company has declared a 75 cent dividend, payable November 15, to stock of record October 31. Transfer book closed from November 1 to November 15, 1892, both days included. The company has just finished an underground conduit system at Springfield, Mass. Ten new cables, carrying 2,000 wires, are now being connected.

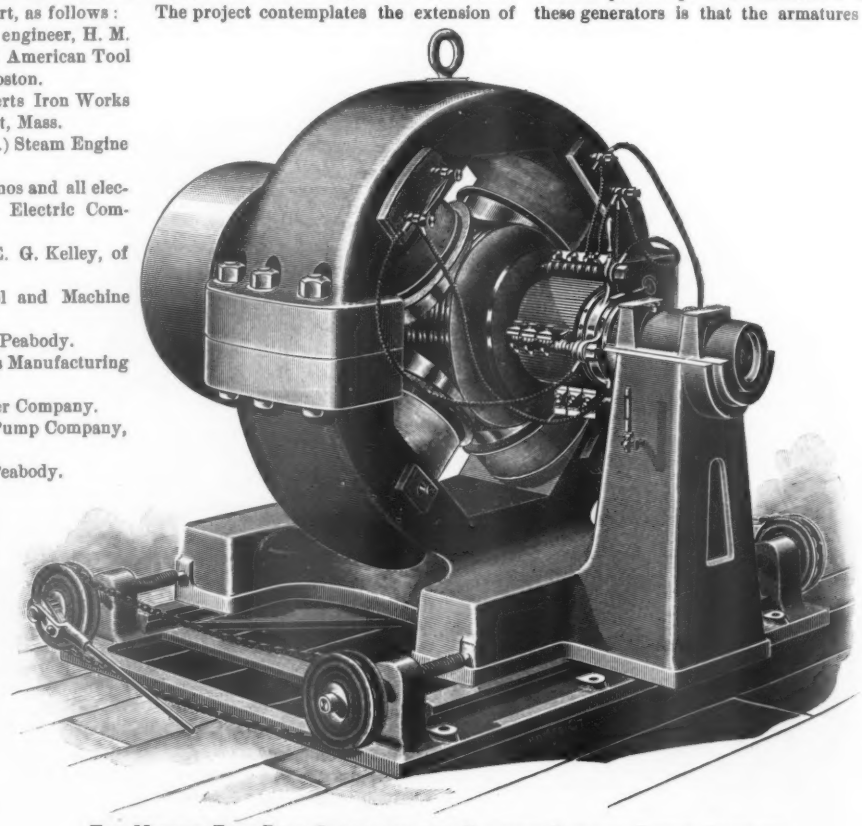
The Missouri and Kansas Telephone Company is at work now on a project which will result in the extension of telephone communication with Maryville, Barnard, Arkoe, Bolckow and Rosendale, Mo., inside the service which now extends to Savannah. The project contemplates the extension of the line from Savannah to Maryville, and Mr. Newcomb, of the telephone company, is at present arranging for the extension of the line.

Dr. Webb has established a central telephone office at Shelburne Farms, Vt. It has a metallic switchboard that will accommodate 75 stations. It is also a metallic system throughout, with improved instruments. At present there are 15 stations working. The exchange will be in operation night and day, Sundays included. It is connected with the Burlington exchange by a special metallic circuit, which brings all the stations on the farm in direct communication with all city subscribers. The system will also be used as a fire alarm system. In case of a fire it will be reported to the central office, and the operator there will ring a large gong. Then he will notify the men scattered about over the farms where the fire is by telephoning to these various stations.

H. W. Deeds, of Indianapolis, has succeeded C. E. Siseoff as manager of the Elkhart, Ind., telephone exchange.

The City and Suburban Telegraph Association recently completed a new copper circuit between Cincinnati and Springfield, Ohio. The line has been open for business only a few days.

The Hudson River Telephone Company have at last got located in their handsome new quarters in Albany, and expect to be able to show a great improvement in both their local and long distance services.



THE MATHER FOUR-POLE GENERATOR FOR ELECTRIC RAILWAY POWER STATIONS.

The Mather Generator for Electric Railway Power Stations.

The Mather Electric Company, of Manchester, Conn., have been for a number of years well known builders of dynamos and motors. They are now putting on the market a railway generator which is meeting with considerable favor. These machines are made in a four pole type of 50, 75, 120 and 180 kilowatts capacity, and in a six pole type of 225 kilowatts capacity. The claims made for these generators are that all the magnetic and electrical parts are absolutely balanced; they are machines which will run at safe and manageable speeds and give large outputs for their respective weights; absolute freedom from sparking and efficiencies as high as those of any other machines of the same type on the market.

An important point in connection with these generators is that the armatures are built up of specially selected and tested sheet iron, which enables the Mather Company to construct armatures of 24 and 30 inches diameter, which run in intense fields at speeds of 400 or 500 revolutions per minute, with very little heating.

Another factor which adds to the simplicity of operating these generators is that the speeds of the various machines have been adjusted to the sizes of the armatures. The limit of speed is entirely a mechanical one; the faster the generator runs, the greater the output obtained. The Mather Company has made no attempt to make these generators slow speed machines, believing that speeds as high as are consistent with good mechanical principles will prove more satisfactory than anything slower.

The Fritsche Dynamo.

One of the most remarkable developments of the drum armature is that due to Mr. Waldemar Fritsche, of the firm of Messrs. Fritsche & Pischon, of Berlin. Those who have had experience of the actual design of drum armatures know that the end connections, especially of the two-pole machines at present in fashion in England, are very complicated and unwieldy. The cost of power for excitation and of copper for the fields is also serious, because the air gap is considerable, and a strong field is desirable. The air gap might be reduced by using a Pacinotti armature, if the field poles did not then become hot; or by adopting hole winding, if that did not cause sparking at the brushes. A two pole hole-wound drum

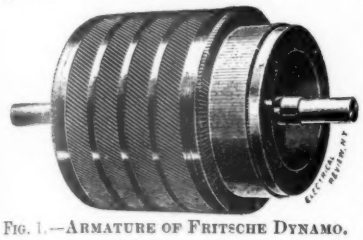


FIG. 1.—ARMATURE OF FRITSCHE DYNAMO.

machine would also be troublesome to make neatly, unless the output were very small for the size of the armature. Mr. Fritsche has minimized both these difficulties by one device. He uses a winding which has no "connectors" at the ends of the armature, and in many cases employs iron as the conductor, so that the air space is very small. Sparking due to excessive cross-induction is avoided by making the machines multipolar, so that the pole faces are fairly narrow. The winding in the drum armature is shown most clearly in Fig. 1. This belongs to a four pole machine shown in Fig. 2. It will be seen that the armature conductors lie spirally, and make a quarter of a turn in the length of the armature. The drum is wound with two layers of conductor, and the inner layer, which cannot be seen, is wound in a left-handed spiral of the same pitch. There are no connectors. The ends of the conductors of the outer layer are soldered directly into the commutator bars, and the ends of the outer and inner conductors are also connected together. The armature circuit thus forms a continuous winding round the armature, the turns being in series. Four lengths of conductor —two outside and two inside—thus form a circuit extending right round the armature. The pole-pieces are made diamond shaped, instead of rectangular, as the corners would obviously be useless. The reduction of the pole area is the only drawback to this winding, and it appears to be quite outweighed by the perfect simplicity of construction. The absence of end connectors also admits of the construction of a large commutator, which is a very important feature. This also allows sufficient room for central ventilation. The armature does not project much beyond its field, so that the bearings are not wide apart and the armature is firm and rigid.

If we imagine the iron core drawn out of the armature just described, we should have a sort of tube of conductors with a commutator at one end. If this tube be widened at the pulley end we get a core with the armature at the small or apex end. If it be widened still farther we eventually obtain a disc with the commutator at the center. This is one form of Fritsche flat-ring armature. The field resembles that of an alternator, having N and S poles opposite. The poles are cut away to suit the peculiar shape now taken by the conductors. Mr. Fritsche, however, replaces the copper by iron slips. The armature so produced is simple to make, very strong, easy to insulate and splendidly ventilated. If the commutator end of the drum be widened, instead of the other end, the segments come on the outside, and this is the arrangement Mr. Fritsche prefers. The commutator segments are soldered to the ends of the iron slips and make connection across. The commutator produced is thus very large and cannot heat, and the sections pass the brushes so rapidly that there can be no sparking.

We are indebted to London *Industries* for the above description and the accompanying illustrations.

LETTERS FROM A LABORATORY.—XX.

BY JULIAN A. MOSES.

The other day my attention was called to some excavations that were being made by sub-way workmen on Madison avenue. Passing a place where a man was soldering a joint by means of a gasoline torch, I stopped to notice the manner in which the connection was made. The process interested me and I waited for a few minutes. Soon after a young man dressed in immaculate afternoon costume also stopped, apparently interested. It so happened that immediately in front of him was another of these gasoline torches roaring away in full blast, but the young man evidently did not know what the instrument was, for wishing to closer observe the progress that the workman had made, he took one step forward and leaned over to see. The invisible flame of the torch set fire to the leg of his trousers, and, in less time than it takes to tell, the immaculate looking young man was a sorry looking sight. I imagine that his thoughts, if spoken, would not look well in print, for I know that any other person would have acted differently; but he looked volumes and said, "I really don't think that I can do justice to the subject."

There are many processes in the art of soldering which the amateur, unless he is told, will spend much time and labor to acquire for himself. The occasion may arise when you will be obliged to solder over a hole in some piece of metal. This is a difficult process, but the following methods ensure success:

It is evident that if we attempt to flow the solder over a hole, if it be of any considerable size (since liquids and solids in a fluid condition tend to assume the spheroidal shape), the liquid metal will "shrink" from the hole and form a ring around it. This would defeat your purpose, and you would not be enabled to bridge the space. It may, however, be done by coating the soldering iron with the metal which we wish to "flow." Where lead solder is used this process is called "tinning," and is usually accomplished by moistening the soldering iron while hot with the soldering fluid (generally zinc chloride made by dissolving zinc in hydrochloric acid) and touching it to the solder. A superficial amalgamation between the two metals is the result, and a coating of the solder is seen on the outside. This is simple enough, but when the precious metals, such as platinum and gold, are used, the process of "tinning" becomes more difficult. What is known as gold solder, a combination of gold, silver and copper, with the gold predominating, is used in this case. The soldering iron or "leader" which may be a piece of No. 12 B. W. G. iron wire, may be covered at the tip with a coat of this solder in the following way: Lay a small piece of solder upon a block of charcoal, and with the flame of a mouth blow-pipe heat it until

FIG. 1.—FACE AND HEAD OF SAFETY BRAKE SHOE.

it melts to a globule; a small piece of borax must be placed over it to serve as a flux and prevent oxidation. Bring the wire into the flame until it is red hot, dip it into the fused borax which swims upon the surface of the gold, and immediately after plunge it into the melted solder. This globule of solder must now be allowed to cool upon the end of the wire, and when quite cold it will be found to be firmly attached to it. In case too much solder has been used it would be advisable to heat the bead again and allow the superfluous metal to drop back upon the so'dering block. The "leader" is now in

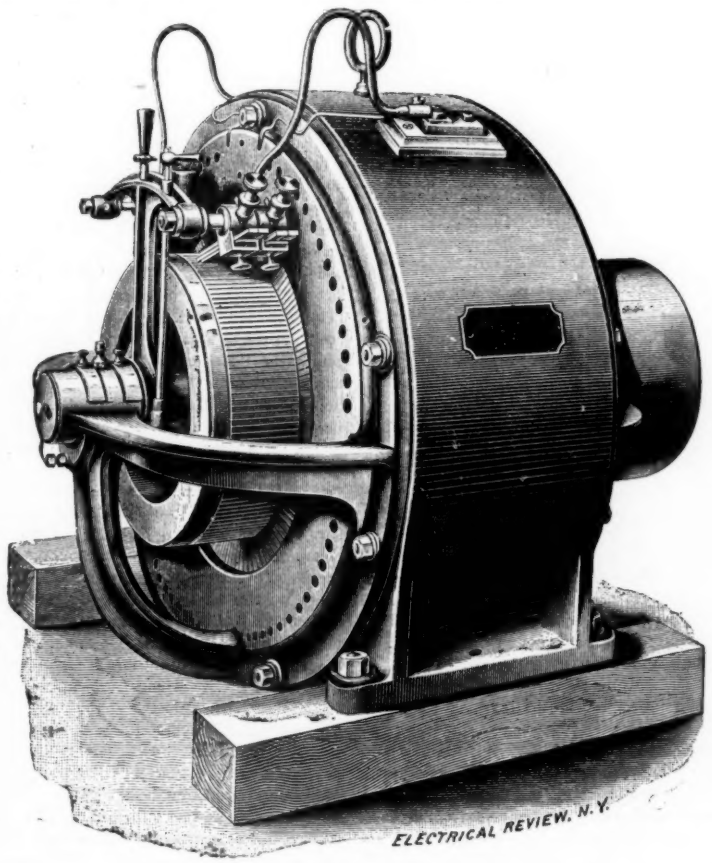


FIG. 2.—THE FRITSCHE DYNAMO.

condition for successful soldering, and it remains for you to satisfactorily accomplish the task of covering the hole, whether in a piece of platinum or gold. Care must be taken that the "leader" is not heated much above the melting point of the solder, as the solder is easily burned. When this occurs, the process of "tinning" must be performed again. Having placed a piece of solder over the hole and a piece of borax upon the solder, the "leader" must be placed so as to communicate its heat to the solder and melt it. Remember that the point is to all intents and purposes of solid gold, and if it be placed in the center of the hole so that it touches the edges on all sides, the now melted solder will attach itself to the tip. When it is withdrawn the solder will flow together and the hole will be successfully bridged over. The solder in cooling will not "shrink" from the hole if the globule has been once formed over it. This is one method and may be used where the hole is of inconsiderable size. Where the hole is larger than, say, one-eighth of an inch in diameter, it is advisable to cut out a thin piece of the same metal a little

FIG. 2.—SAFETY BRAKE SHOE SHOWING WEAR.

larger than the hole and burnish it over the hole until it fits exactly. Remove this and flow a small quantity of solder upon the under surface, using the borax as a flux. Replace the piece over the hole, add more borax and direct the flame of the blow-pipe upon it until the solder melts and the piece of metal is seen to settle down into place. When the solder is cool the hole will be found to be satisfactorily covered. The thickness of the covering piece is of the greatest importance, and is dependent upon the amount of the strain that is to be put upon it afterwards. There is, however, a certain limit to its thinness; for if its volume is very small the blast from the blow-pipe flame will burn it and change it to its oxide. Even platinum, when drawn into very fine wire may be melted in the flame of a candle.

Patent Safety Brake Shoe for Electric Car Service.

This meritorious and useful device has attracted much attention and favor with street railway companies, especially electric railway people.

It has been in constant use during the past year on several New England electric street railways, and is now being introduced on some of the most prominent lines in other States, notably New York, Ohio and Pennsylvania.

Strong testimonials have been given in favor of the efficiency of this brake shoe by several companies who have had it in use for a year or more, the president of one company writing as follows:

"The safety brake shoe manufactured by your company has been in use on the Essex Electric Street Railway since March, 1891. They were put on experimentally at first, with the following results: We found they would grip the wheel more effectively, and would stop a car immediately without the sudden jerking usual in the ordinary shoe, and would hold a car on grades without slipping. We regard the saving in wear and tear on the shoe of at least 30 per cent., and certainly a great saving is made on the wear of the wheel. We have worn these shoes down to less than one-eighth of an inch in thickness without breaking or renewing. As a result of this experience we applied the shoe to all our electric cars and a part of the horse cars."

The accompanying illustrations show the face and head respectively of the safety brake shoe. The shoe is cast in two parts; the head being fastened to the brake beam becomes a fixture of the truck, while the face is secured to the head by keys or bolts. The face is cast with holes into which are driven wooden plugs, giving a bearing surface against the wheel of wood and iron, and a grip on the wheel of two-thirds more power than any other shoe, thus stopping a car more quickly and overcoming the jumping of a car when the brakes are set and the sliding of the wheel on the rails. It is very effective on heavy grades. Another advantage is that this shoe will stand the wear down to one-eighth of an inch in thickness without breaking, thus effecting a saving of at least 20 per cent. in the wear of the car wheel itself. For further particulars correspond with the Safety Brake Shoe and Construction Company, No. 620 Atlantic avenue, Boston, Mass.

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We have received "Proceedings of the Fifth Annual Convention of the Train Dispatcher's Association of America, and the Train Dispatchers' Mutual Benefit Association," held at New Orleans, La., June 14 to 17, 1892. The business transacted and the discussions indulged in at this meeting add to one's conviction that the train dispatchers are an able and brainy class of workers. The practical examples of train dispatching presented to the members by a committee for solution seem to be a valuable feature worthy of adoption in a modified form by the National Electric Light Association and the various street railway associations.

An American "professor," evidently a Bowery fakir cut of a job, has been travelling through the Hungarian provinces trying to interest the rural population in a "lightning trap." The "professor" erects tall poles, which attract the lightning, and by means of a system of wires he collects the electric sparks in small caskets, the walls of which are so constructed that the bottled lightning is isolated and preserved in a fresh and lively condition. It can be carried about from place to place, and so utilized for agricultural purposes that any farmer can have what he so often wants, a shower of rain upon some particular field, while all the fields around continue dry. The "professor" says he trapped 14 flashes of lightning during the August storms. The police of Pesth were afraid he might attempt to teach the ruralites that little American game played with walnut shells and a little ball, so they trapped the "professor" in a little cell in a big jail.

The development of the electric launch in this country has not been as rapid as it has in England. Boats propelled by storage batteries were in operation on the Thames some time ago, but it is only within the last year that a few such craft have been built in the United States. Our illustrated description in this issue of the new electric launch just completed to the order of Mr. John Jacob Astor is of more than passing interest. It foreshadows the possible development of this application of electricity under the patronage of a progressive gentleman of wealth. Mr. Astor has been an enthusiastic devotee of the Goddess of Electricity for a number of years, and it had been his desire for some time to own and operate a boat propelled by electricity. The "Corcyra" is but the forerunner of another and larger electric launch which Mr. Astor proposes to build for use as a tender to his palatial steam yacht, the "Nourmahal." It is not often that a gentleman of Mr. Astor's position in the world devotes any time to electrical study, but it is certain that he feels amply repaid for whatever time and money he has spent in this direction.

The columns of the *Pacific Underwriter* for October contain an able article by George P. Low, the electrical inspector of the Pacific Insurance Union, in which he takes up the matter of electrical fire risks and analyzes them thoroughly. While admitting that there is some element of danger in electric lighting of buildings as at present conducted, Mr. Low positively affirms that the electric light is the safest known method of artificial illumination, and that, with proper precautions and conscientious work in the matter of wiring, it can be considered as absolutely without risk. The electrical field, like every other large and growing industry, has its impostors, men who by trickery and incompetency throw discredit on the profession they pretend to adopt, and electrical construction, through the element of mystery attached to it, and the ignorance concerning it displayed by the average layman, affords them unusual opportunities in this direction. Properly insulated wires of high grade, put in by a man who thoroughly understands his business and who does his work well, are absolutely safe, and Mr. Low strongly urges the Fire Underwriters' Association to adopt rules making this class of work compulsory, and having it at all times accessible for inspection.

In another part of this issue will be found some interesting observations on the use of bronze wire in telegraphy. They have had some curious experiences in this connection in Belgium with circuits used for both telephonic and telegraphic transmissions.

We have a little news this week about the municipal electric lighting plant just completed at Peabody, Mass. It is the first station erected under the new Massachusetts law which permits municipalities to become competitors of private corporations in furnishing gas and electric light. The operations of this plant will be carefully watched by those political economists who believe that no municipal government of an electric plant can equal in economy and efficiency that exercised by a private corporation. These people also believe that it is not fair for a State government to accept corporation fees and taxes and then to enter into the same business, as a competitor, under conditions which are always more favorable to the State than to the individual company. The management of the Peabody plant now have an opportunity to refute or affirm these theories.

ON A MASK OF FRANKLIN.

It has been an intense pleasure to read the admirable series of papers by Mr. Lawrence Hutton, running through the last three numbers of *Harper's Magazine*, and to study the wonderful collection of masks and death masks of some of the movers of this world. The November number of the magazine contains some of the most valuable in the entire collection. A mere enumeration will induce the reader, if he is anything of a hero worshipper, to read the article.

We have before us almost life-like counterfeits of Cromwell, the iconoclast, with massive jaw and stolid, firm-set lips, a true man with an iron mask; Charles the Twelfth, with a brow broad and smooth as that of Napoleon, whom he strongly resembled, with a smile of self-confidence, such as would befit the man who swept like a storm, through Russia; Frederick, truly surnamed "The Great," who like Themistocles, "found his country small and left it great;" the classic profile of Napoleon, with the finely chiseled features of a noble Roman, "the noblest Roman of them all;" the placid, noble face of Abraham Lincoln, humane in its loyable, kindly lips that seem to speak, "with malice towards none;" and on the same page, the faces of the two greatest men this country, with all its capacity for bringing out what is strong and noble in character, ever produced—Washington and Franklin.

The visitor to the Metropolitan Museum of Art must have seen and admired great numbers of the representations of these two illustrious men in the large room devoted to them alone, and taken at all periods of their lives. On the floor below, the precious death mask of the immortal Washington can be easily recognized. But in Mr. Hutton's pages, for the first time, we have seen the mask of Franklin, the statesman, scientist and moral philosopher.

Truly it is a grand head. A head of strength, sweetness, indicative of that serene, watchful and courageous mind, which while capable of all possible knowledge, had set unto itself its limits. To those who are not accustomed to find the living soul in the features of a mask consciously restrained, while being reproduced by the modeler, it would be difficult to find in the firm-set mouth, the playful smile that always lurked in its corners, and, under the closed eyelids, the full and speaking eye of one of the most benevolent of men; but "in the immovable heights of that great dome of thought," the fullness and ripeness of this masterpiece of nature stand boldly forth. From the contact of thoughts in this living cell flashed forth the spark of intelligence which found its kindred in the heavens.

It is wonderful to consider the evolution of a mind like Franklin's. After having acquired a competency by the practice of those shrewd virtues which his examples and writings have engrafted in the minds and practice of the American people, he devoted himself in his "retirement," as he expressed it, to science, and particularly electrical science, which he had so much contributed to enrich.

In his forty-first year he made his first electrical experiment, and five years after, his theories, like winged seeds, had fallen into, and rooted in the minds of men. Leaving to others their development into fruitage of science, he turned his thoughts and talents to the needs and uses of his countrymen. History, on one of its brightest pages, has shown how gloriously the end of his long life was woven into the fabric of this greatest of all republics.

It is understood that the census reports of the electrical industry in New York State will shortly be issued. The statistics carry only as far as June, 1890. Some sort of a permanent census bureau should be established, which could render fresh and accurate industrial reports at desirable intervals, and the electrical industry should occupy a place in the consideration of this bureau which its $800,000,000 capitalization entitles it to.

CORRESPONDENCE.

OUR LONDON LETTER.

Our Engineers and our vestries seem to have accepted as a fact the notion that London is empty, and accordingly, in their special departments of work during the past month, most satisfactory progress has been made. In the principal thoroughfares of the east and central districts of the city the laying down of mains and fixing of new installations have been so industriously worked that they are now happily finished. Besides installing the electric light in numerous private establishments, a grand and potent success has been the removing of over 120 gas lamps from the streets, and erecting about 50 brilliant electric lamps to supply their place. The whole permanent staff can now, therefore, turn their attention to the western district, and are carrying on their operations at the same time on two lines—from St. Paul's Church yard to Temple Bar on the south, and from Gray's Inn Road to Goswell Road on the north. Outside the city, likewise, considerable progress has been made, and in this progress, as usual, the vestry of St. Pancras is well to the front, both street lighting and house lighting advancing almost side by side. The line of arc lights along the Easton Road to King's Cross, for which permission was given in April, is now completed, and with the lamps previously erected in Easton Road and Tottenham Court Road makes up over one-half of the available output of the machines. In consequence of this great increase of business, the prices charged, which are even now lower than those imposed by any of the private supply companies, will immediately be so reduced as to make electric light cheaper than gas.

Nor is this forward movement confined to London and its subdivisions. It is now taken up by all the local authorities in the suburban towns and throughout the whole lower valley of the Thames; and in all, it proceeds upon the one principle, the comparative prices of the rival illuminants. In more than one case this principle is expressed in very plain terms. The Brentford and Richmond Gas Companies have just raised the price of gas, upon receiving notice of which the Richmond Town Council and Brentford Local Board at once solicited tenders for the introduction of electric light. The Chiswick and Twickenham Local Boards have strongly protested against a similar rise in their gas charges, and at their last meeting, without waiting for reply, they instructed the lighting committee to consider the providing some other mode of lighting their districts. The Heston and Isleworth Local Boards, which have the largest area of any urban sanitary authority in the kingdom, have also protested against their gas bill, and have added distinctly to their protest that, if the increased charge were enforced, they would at once arrange for lighting their combined parishes with electric light. To this last body the gas company replied that they would reconsider the matter in dispute; but there can be little doubt that here, as in too many more important and interesting affairs, the promptings of prudence come too late.

The same struggle, with the same invariable result goes on in other places as here. Thus in Berlin, where electric lighting was received with special favor, a public meeting was recently held to protest against its excessive cost. After many and various complaints had been heard, an important resolution was passed by the Berlin Guild of Innkeepers, that if the elektricitatswerk did not lower its charges from January 1, 1893, all the *cafés* and restaurants would cease to use the electric light. The desired object has been secured. The company has stated that from the date named the charge for glow lamps will be reduced from 5 to 2 marks, and for arc lamps from 30 to 15 marks.

The Construction of our new underground railway, authorized by Act of Parliament on June 28, has commenced at last. It is only now the necessary preliminaries have been worked out by the engineers, Sir Douglas Fox, Mr. Francis Fox and Mr. J. H. Greathead. Messrs. Vigers & Company, who have made a valuation of the land, estimate the cost at about £400,000, the whole cost of construction will exceed £1,200,000. This sum, however, includes everything with the exception of plant. The title of the company will be the Great Northern and City Railway, and its first directors will be Lord Camoys, Lord Lauderdale, Mr. Roger Richards, Mr. Daniel Bagley and Mr. John Hamlin Bower. The district through which the line will pass is one that greatly needs the accommodation which it is intended to afford. According to present arrangements, stations will be built at Drayton Road and Essex Road. A request has been made to erect another station at the southern end of Highbury Fields: but this will depend on the amount of support that can be guaranteed from that locality. The length of the line will be three miles, and the journey, including stoppages, will occupy 10 minutes. Two tunnels lying side by side will be sunk at a depth of 50 feet from the surface; one tunnel will be used as a down-road, the other as an up road. By this contrivance it is hoped the air will be kept fit for respiration, as there will be no counter influence to send back the impure air which the engine is bound to drive forward. Large lifts to accommodate 100 persons will be constructed at each station, and fresh air in abundance will thus pass down into the tunnels when the shafts are not in use. The carriages will be constructed on the same plan as those on the Great Northern Railway; but the only motive power will be electricity. There will be only two classes and the fares will be exceedingly moderate. It is promised that the line will be in thorough working order in two years. Trains during the busy time of the day will be run at intervals of there minutes.

The amalgamation of our two telephone companies, the National and the New, does not appear to have effected anything for the advantage or the convenience of the public. Let us hope, however, that some good may result from the visit of the President of the combination, the Duke of Marlborough, to the telephone works in the Swedish capitol. His Grace could not go to a better school; and the officials at the Allmäuna telefonbolag were astonished and delighted at the earnestness and submissive docility with which he took his lessons, minutely examining every detail of the works and asking for explanation of everything new. And though the amount of technical knowledge which he displayed surprised the officials, yet in order to secure a fuller and more practical understanding of their system, he has arranged to despatch the company's head engineer, Mr. A. R. Bennett, for a lengthened visit to Stockholm. Except in your own favored land, the United States of America, there is, perhaps, no place where the use of the telephone has been so greatly developed as in Stockholm. Berlin and Paris, though much more pretentious and wealthy, are far behind in the race, and London is simply nowhere. A report of the Allmäuna telefonbolag has just been issued, which shows that during the last two years subscribers have increased at the rate of 700 a year, the total number being now over 7,000, a large proportion in a city with only 200,000 inhabitants. The company employs 73 male and 138 female operators, and 90 repairing hands. In order that the subscribers may also avail themselves of the inter-urban state lines, its net is being relaid with double wires. The cables of the company now cover 852 miles. Outside Stockholm 19 central stations were added last year, and the profit for the year amounted to £4,540.

JOSEPH FERENCH.

LONDON, October 29.

OUR BOSTON LETTER.

The Davis Electrical Works, of Springfield, Mass., has established a branch office in this city at No. 243 Franklin street.

Musical Entertainment given at the rooms of the New England Electric Club in this city on Tuesday evening November 1, was a successful affair and the attendance large.

The C. F. David Advertising Agency, of Boston, was incorporated October 17, 1892, with officers as follows: C. F. David, president and general manager; W. E. Bowen, treasurer, and C. B. Hull, secretary.

Mr. D. P. Gosline, the well known dealer in machinery specialties and ventilating fans at No. 30 Oliver street, this city, has been appointed Eastern agent of the Eddy electric motors. An excellent appointment.

The Westinghouse Electric Company's New England department has closed contract for 12 car equipments, including two 20 horse-power single reduction motors to each car, with the Springfield, Mass., Street Railway Company.

Married.—Mr. Alfred Arthur Ziegler, of Messrs. Ziegler Brothers, manufacturing electricians, this city, was married to Miss Magdalene Elizabeth Dorr on Tuesday, October 18.

The Gethins Electrical Manufacturing Company, this city, is pushing its improved gravity battery, and this product is becoming extensively adopted for automatic burglar and fire alarm systems. Quite recently a large order was booked by the Gethins people from the National Automatic Fire Alarm Company, of New Orleans, La., who have had the gravity battery in use for several years and know its merits.

The Walworth Manufacturing Company is making a specialty of steam power equipment, including engines and boilers with all their appurtenances complete. This kind of installation has been done recently for the Lowell and Suburban Street Railway Company. The company has completed the steam fitting and piping work in the West End Street Railway Company's power stations in this city and at East Cambridge. The company is now shipping material for the steam work for the power stations of Brooklyn, N. Y., City Railway. Also shipping poles to the Omaha Street Railway; Baltimore Street Railway; Carrollton Street Railway, at New Orleans; to the Southern Pacific Improvement Company, at San Francisco, Cal., and to many other railway companies. The Walworth company's general output this year has been double that of any previous year; in fact, the company's output of electric railway supplies and power station equipment has been far beyond all expectations and the manufacturing facilities have been pushed to their utmost capacity to enable the company to promptly fill orders.

Boston, Nov. 5. W. I. B.

OUR CHICAGO LETTER.

W. A. Pamperin, of the Electrical Manufacturing Company, Oconto, Wis., was in the city this week.

J. B. McDonald, president of the American Battery Company, has gone to New York on a short business trip.

George Cutter is developing a very neat form of a push-button switch, which will be ready for the market shortly.

E. Wilbur Rice, the well-known superintendent of the Thomson-Houston Electric Company, paid Chicago a flying visit last week.

E. W. Hammer, late with the Chicago Electric Manufacturing Company, is now connected with George Cutter's shop on South Canal street.

The Electrician employed by the board of trade was severely injured Tuesday last by being caught in the machinery while attempting to start the electric plant which furnishes light to the exchange hall.

Mr. Richardson, of the Enterprise Electric Company, has just returned from a trip to St. Louis, and reports business at their St. Louis branch flourishing. Mr. Richardson reports having secured some fine orders as the result of his trip:

W. H. McKinlock, president of the Central Electric Company, reports having received several very large orders for the well known Okonite wire during the past week; also that his company has secured the agency for the Hart switch and Iona porcelain rheostats.

The Central Electric Company, with their usual amount of energy, have been beautifying the appearance of their store on Franklin street by painting the inside as well as the store front entirely white, making the offices very light and cheerful and making the store very attractive. This company reports sales of a large amount of the well known Okonite wire of late, and that business in general is very good.

Chicago, Nov. 5. M. J. B.

OUR CANADIAN LETTER.

Port Hope, Ont.—The Town Council has instructed the light committee to ascertain the cost of an electric light plant.

Trenton, Ont.—The Council has engaged Architect J. E. Belcher, C. E., of Peterboro, Ont., to prepare plans for a power house for four water wheels of 100 horse-power each.

Niagara, Ont—Voting on a by law for the raising of $14,000 debentures for the erection of an electric plant took place here on October 24. The proposition was carried by a majority of 92.

Montreal, Que.—The Town Council of Cote St. Antoine, Que., has accepted the offer of the Montreal Street Railway Company for the construction of an electric railway through the town.

London, Ont.—The amended proposal of the new Electric Street Railway Company has been accepted by the Council. Construction is to be begun within 60 days and seven miles completed within the next two years.

J. A. C.

Montreal, Nov. 5.

PERSONAL.

Mr. David B. Sickels, ex-minister to China and second vice-president of the American Surety Company, has been recently elected a trustee of the newly formed Rent Guaranty Company, of New York.

Mr. R. E. Dunston, of Hartford, Conn., recently accepted the general managership of the Wightman Electric Manufacturing Company, of Scranton, Pa. He arrived at Scranton to assume his new duties just in time to learn that the company had made an assignment. Mr. Dunston has been appointed receiver for the company.

OBITUARY.

A. B. Caldwell, a prominent citizen of Washington, Pa., and president of the People's Light and Heat Company of that place, died on October 27, aged 66 years.

Moses F. Hatch, of New Bedford, Mass., general manager of the Southern Massachusetts Telephone Company, dropped dead in the Park Square Station of the Old Colony Railroad, in Boston, on October 29.

An Automatic Trolley Disconnector.

TO THE EDITOR OF ELECTRICAL REVIEW:

Several months ago there was brought to my notice a machine called the automatic disconnector for overhead conductors, which I think is a splendid idea and does away with all danger in whatsoever wire it may be placed, whether trolley, electric light, telephone or any other. At the time I first saw the machine it was a very crude affair to what it is now. The Johnston Safe Automatic Electric Company, of Richmond, Va., own the patents, and, thinking that the machine was not just what it should be, after a trial made in Paterson, N. J., in the latter part of June last, left it in the hands of Mr. W. A. Cullen, superintendent of line construction for the Paterson Railway Company, to perfect, which, after repeated trials and tests (which brought to light many small mechanical defects in the machine, all being overcome and remedied as fast as brought out), both in private and in public, he has finally accomplished. To make it clear to all just how the machine works, I will tell about a test I witnessed a few days ago. Two of the disconnectors were cut into a line of trolley wire at about 1,000 feet apart and subjected to the same strain as when ordinarily strung (that is, drawn so tight that between the spans, a distance of 125 feet, the sag in the wire is but six inches). It might be well, just at this point, to give a description of the machines. I measured one of them in position and found it to be just three feet in length; this includes the ears in which the trolley wire is fasteued. The machine proper is less than 20 inches long and five inches in height, and so ribbed on the under side that the trolley wheel follows without the least danger of flying off, and I am told weighs just a trifle over six pounds.

The machines are divided into two parts by a piece of *lignum vitæ* two inches by five inches, which partially forms the insulation between them. This piece of *lignum vitæ* is capped by a casting of brass, by means of which the disconnector is suspended from the span wire, from which it is in turn insulated from the span by the same kind of insulator that is used on the rest of the line. To this cap also the tap is made from the feeder wire. From this the current is led to two levers on the opposite sides of the machines by a fuse wire, the melting point being any number of amperes more, as may be determined, than will at any time be required under ordinary running on that section of the line. These levers are held in place by the strain on the trolley wire, which closes one open spring and opens one closed one, on the opposite sides of the machine; this, as soon as the wire is in any way broken, tends to pull the wire back and so releases the levers, which immediately fly up, so breaking the circuit and making the wire perfectly harmless. The levers can be set to open the circuit at any desired relaxation of the strain and, in case of fire, can easily be tripped by a smart blow, thus cutting off the current, and so all danger to the firemen vanishes, even if it should happen that they turned a stream of water on the wire. The machine is only one inch in width.

To go back to the test. When all was in readiness, word was given and a lineman cut the wire between the middle spans at a distance of nearly 500 feet from each machine; as far as the eye could tell at almost the same instant the wire parted, the levers on the side of the machines nearest the break in the wire flew up, opening the circuit long before the ends of the wire struck the ground. This was repeated several times to prove beyond a doubt that it would work without a failure. At one or two of the trials I noticed that the linemen, almost before the wire struck the ground, had caught the broken ends with their bare hands and commenced to repair the break, showing that they had entire confidence in the machines. Now we come to a more severe test. The linemen were instructed to cut the wire close up to one of the machines, so close, in fact, did they cut it, that they barely left enough to reach the ground. This left the one machine to take care of nearly all of 1,000 feet, which it did thoroughly, the levers having sprung open long before the end of the wire had touched the ground, showing conclusively that the machines were a success beyond the shadow of a doubt. This machine can be put up at very little expense, either while the line is being constructed or at any time afterward, and the first cost is very moderate, considering its many advantages. Should any one wish to make a personal examination of the machine, if they will call on Mr. Cullen, No. 22 Broadway, Paterson, N. J., he will gladly, I am sure, explain more fully to them the working of these automatic disconnectors than I am able to do.

Yours truly, W. L. K.

Paterson, N. J., Oct. 29.

Important New Measuring Apparatus.

The study of applied electricity is now so universal that high schools as well as colleges devote considerable time to the subject. Apparatus adapted for research work is quite too costly for elementary instruction, and in consequence until recently many schools have not been able to treat this important branch as fully as was desirable. Instrument makers are appreciating the need for first-class elementary instruments, and in this issue we give a brief description of a few important pieces which are being placed on the market by Queen & Company, of Philadelphia. We are informed that the different pieces have been designed in their laboratory and are constructed substantially, but without the same degree of finish which is placed on the finer apparatus which this firm makes.

Fig. 1 shows a D'Arsonval galvanometer

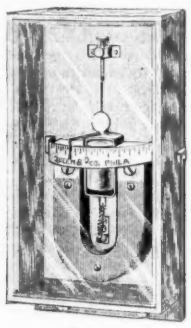


FIG. 1.

intended to be placed against the wall of a laboratory. It has a graduated scale with pointer and also a mirror, so that readings may be taken directly or by means of a telescope or lamp and scale. This instrument is extremely dead beat, and is adapted for general work where quick measurements are desired.

Fig. 2 represents a universal tangent galvanometer which is especially designed for determining current in absolute measure, and for showing the effects of variation in the different quantities contained in the tangent galvanometer equation. It has two mahogany rings, built up of a number of pieces to prevent warping. One ring is wound so as to rotate freely on a vertical axis, with a pointer and scale graduated to degrees for use in sine measurements. The compass box slides along the horizontal graduated bar, so that the needle may be placed in the plane of either coil, as a tangent galvanometer; midway between them, as in a Helmholtz-Gaugain galvanometer, or at any point upon the axis outside the planes of both coils, as in the Weidemann type. The instrument can thus be used for a great variety of purposes.

The quadrant electrometer, Fig. 3, is intended for use by the beginner, and is of simple construction, while capable of a high degree of accuracy. The quadrants are fastened to a circular block of hard rubber, two of them being made of one piece of metal bent so as to have a level surface on top, to which the brass suspension tube and one binding post are attached. The aluminum needle, provided with mirror for reading deflections, and vanes for damping the system is suspended from an adjustable torsion head, thus connecting it with one pair of quadrants. In this way the Leyden jar arrangement, otherwise necessary for maintaining the needle at a high potential, is avoided. A metal case encloses the apparatus, leaving room inside for a small dish of sulphuric acid and pumice stone for drying purposes.

Fig. 4 represents a Coulomb electrometer, which differs from other types in that the suspension tube is free to rotate and at the bottom a pointer which moves over a scale graduated on top of the glass case. A mirror is placed in the bottom of the case to avoid parallax.

Fig. 5 represents a very convenient form of magnetometer, which will prove invaluable for laboratory work. The illustration is very clear, so that it is not necessary to give details of construction. Observations may be taken either directly by aid of pointer deflections, or by the telescope and scale method, a mirror being attached to the magnet system. Results almost as accurate can be obtained with this apparatus as with the well known "Kew" pattern, which is very much more expensive.

The earth inductor, Fig. 6, is arranged for exact measurements, and a certificate of constants is supplied as with more elaborate forms. The coil form is built in four sections to prevent warping, and the coil is wound in layers, the diameter of each being carefully determined.

Fig. 7 shows a voltmeter suggested by Professor Ryan, of Cornell University. It is of simple construction and possesses important features, such as freedom of electrodes from angles and sharp corners, easy removal of the electrodes, facility for cleaning and greater homogenity of deposit. The electrodes may be lowered or raised to give corresponding changes of resistance.

Fig. 8 is a subdivided condenser; capacity, one microfarad. It is constructed with great care, and, while much less costly than regular forms for laboratory work, is quite accurate.

Fig. 9 shows a Rumford dispersion photometer, similar to that described in Professor Ayrton's "Practical Electricity." It has a range of measurements up to 1,000 candles.

Queen & Company are issuing a special circular containing prices and full particulars in reference to these instruments. A copy will be forwarded by them to interested parties upon application.

Consolidation in Connecticut.

The New Britain Tramway Company and the Electric Light Company, of New Britain, Conn., have been reorganized under a new management, and both plants will be enlarged and improved immediately. Contracts will be placed in a few days for a new 600 horse-power engine and dynamos for 2,000 incandescent lights. A new building capable of holding 20 cars will also be erected. The present line will be equipped with the trolley system first, and then the road to Plainfield and possibly to Bristol will be

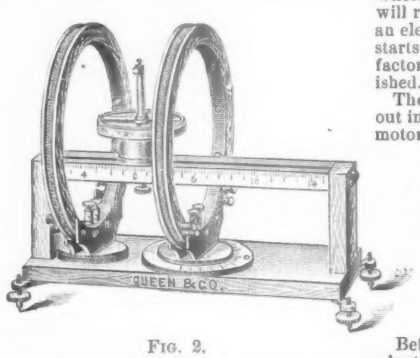


FIG. 2.

built. The directors of the new company are F. G. Platt and C. S. Landers, of New Britain; D. S. Plume and A. M. Young, of Waterbury; John S. Bartlett, Charles H. Newhall and M. P. Clough, of Lynn, Mass.

The officers of the Tramway Company are D. S. Plume, president; F. G. Platt, treasurer, and C. S. Landers, secretary.

The officers of the Electric Light Company are A. M. Young, president; F. G. Platt, treasurer, and L. C. Whitney, general manager.

Mr. A. M. Young, of Waterbury, Conn., is at the head of a party of Eastern capitalists who are rapidly buying up and developing the electrical interests through the State. On November 1 these gentlemen purchased the entire capital stock and plant of the Rockville Gaslight Company, at Rockville, Conn., which company also operates an electric plant. They will at once enlarge and improve the property, and have arranged to add an incandescent lighting department. The machinery has been ordered from the General Electric Company, and under the new management the service will be made as nearly perfect as possible. The officers of the company are A. M. Young, president; F. W. Marsh, of Bridgeport, treasurer, and R. S. Hicks, of Stafford Springs, secretary.

Electrical Transmission of Power for Cotton Mills.

ABSTRACT OF A PAPER READ BEFORE THE NEW ENGLAND COTTON MANUFACTURERS' ASSOCIATION, OCT. 26, 1892, BY C. J. H. WOODBURY.

Every one of the numerous applications of electricity, excepting incandescent lighting and chemical processes, as electroplating, requires the use of electric motors; and some types of dynamos used for incandescent electric lighting contain a regulator which is operated by a motor.

The electric motor, which is the live issue of to day, is based on the principle that

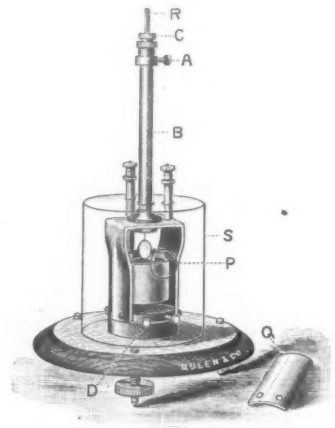


FIG. 3.

while a dynamo will generate electricity if power is applied to revolve the armature, yet, on the other hand, if electricity is applied to the dynamo the armature will revolve. The machine is reversible, and this reversibility has been wisely called by that eminent mechanician, the late Clerk Maxwell, the greatest invention of the century.

There are many places where motors can be operated by wires from any of the direct incandescent lighting dynamos, but if the power required for the motor is more than about one-fifth that required to keep the whole number of lamps lighted, the lights will rise and fall in brilliancy, like those in an electric car when the motor stops and starts, and the lighting service is unsatisfactory and the life of the lamps diminished.

The problem is one which must be worked out in each case; sometimes when a small motor is required for use at short intervals during the day, it might be the more economical to use conductors from a large dynamo which is already installed for lighting the mill at other times. If constant service is required from the motor, then a separate generating dynamo is advisable; and it may be said that in the generality of work it is preferable to put in a generator suitable for furnishing the current to the motors.

Before deciding to install an electric power plant for a service outside of what is already fixed by precedent, expense, delays and disappointment may be avoided by deciding how much you are willing to experiment, and secondly, how much the party doing the work must experiment before the whole installation is in a practical operating condition.

The fact should not be lost sight of that electricity is merely a substitute for other methods of transmission of power. It has its losses at every step in the course, comparable with those of the wear and tear and friction of shafting and belting. Like them, it also costs money, requires attendance, and wears out. It does not in any detail give something for nothing, but the results in comparison with other mechanical means of the transmission of power are merely the addition of a lot of differences. Sometimes these differences are on one side of the account and sometimes on the other.

An installation of motors in one instance may be extremely economical and in another highly expensive in comparison to ordinary methods of transmission of power.

Electric motors, like water wheels or steam engines, have their highest efficiency at a point near to their full proper load, and on either side their efficiency in the percentage of electricity converted into work is diminished. The practical operation of some motors has been improved by the use of flywheels.

In its application for mill service, the most simple uses are those requiring a variable speed and direction, largely on account of causes outside of the electrical conditions in the construction of such motors. It is especially advantageous for elevators in storehouses or other buildings not requiring power elsewhere. A motor can be attached to any elevator machinery operated by a belt, and the elevator can be managed in the same manner as before, so that the men have nothing either to learn or to forget. The first motor used for operating an elevator in a cotton mill storehouse was placed in that service in 1882, and is in as good working condition to-day. Another use having a larger field is in its application for railways in mill yards and buildings. The Salmon Falls Manufacturing Company has 2,100 feet of track in the mill yard, and is operating a trolley system of cars to move all their cotton, supplies, cloth, and coal with two men, thereby dispensing with the services of a team and three men all of the time, and a fourth man a part of the time. The car makes an average speed of 600 feet per minute, and is always ready for service whenever the water wheel is running.

Other mills use electric railroads from the cloth room to the storehouse with even greater reduction in cost of moving the load.

There are two systems of overhead trolley propulsion; the ordinary single overhead wire with the current returning through the wheels to the rails, and thence back through the earth to the dynamo, is the simplest, and the only one that has a practical system of switches in the wires overhead.

This system contains a serious objection in the electric sparks constantly occurring in the contact of the wheels with the rails, and liable to ignite any combustible substance there, and, therefore, could not be safely used inside of mills. For inside use, it is necessary to use the double overhead wire system, by which the circuit is made between the two wires without using the rails as conductors. In either case, the overhead wires should be thoroughly protected by guard wires whenever there is a possibility of telephone or other wires falling upon them.

Electricity is fulfilling a most useful purpose in operating traveling cranes, and the few storehouses in mills which are provided with traveling cranes use them at such infrequent intervals that it is probable that hand power is still the cheapest method of operation; but for erecting shops and other places where constant service is required, electricity affords great advantages for working such cranes.

Motors have been applied to calico printing machines with great success. The absence of heat, small amount of space, little momentum of the revolving parts, and the control by which the machine can be uniformly moved in either direction at any desired speed, are all advantages of the highest practical value.

Other classes of work require that the motor should revolve at as uniform speed as can be obtained by a water wheel, or better if possible. Motors will revolve at a constant speed if furnished with a current of uniform pressure. A compound generator

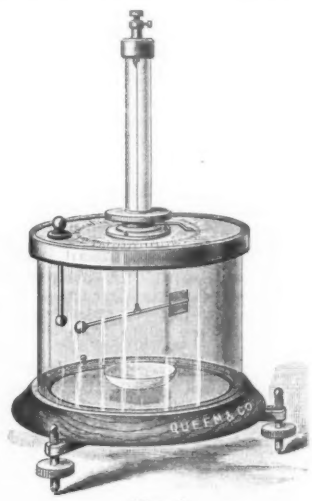


FIG. 4.

will produce a current at a uniform pressure with variations in the load or quantity of current required by motors; and it will also to some extent compensate for slight variations in the speed at which it is driven. Therefore, it may be said that the speed of an electric motor may be more uniform than that of the water wheel or engine from which it derives the power which it gives forth.

A variation in lights is not a direct measure of variation in a dynamo, because a change of one per cent. in the pressure of the electricity in an incandescent lighting system would cause a variation of several per cent. in the amount of light from the incandescent lamps.

The class of service for the distribution of power throughout a mill as a substitute for belt or rope transmission has not been tried in cotton mills, but there are many cases where it has been tried in machine shops, and yielded excellent results. The amount of power required in cotton mills is so much greater than in machine shops that the subdivision should be to a smaller unit than a whole room in a large mill.

I am convinced that such a distribution of power is mechanically feasible, but will it pay to do so when motors and generators each cost nearly or quite $40 per horse-power, or, including wire and foundations, over $100 for every horse-power transmitted?

Another class of applications consists in distributing the electricity from a central station in a mill yard to the various buildings.

The most complete plant of this kind is at the Edison Works at Schenectady, where 1,700 horse-power is electrically distributed to numerous shops situated at various places on a tract some 20 acres in extent.

The Thomson-Houston works at Lynn have an extensive electrical distribution of power in their present works, and will have a larger power plant when their new works are completed.

At the Cumberland Mills, in Maine, 260 horse-power is transmitted over a mile by the Mather electric system and motors are used to drive paper machinery, giving from poorly governed water wheels a sufficiently steady motion for calendars, but the compensation by the compound wound generators is not sufficient to remove the effect of all the variations of speed in the water wheels from appearing in the motors, and these motors cannot run Fourdrinier paper machines, although motors in these mills, deriving their power originally from a steam engine, perform satisfactory work in driving paper machines.

At these same mills an installation of motors is under way for the transmission of 1,200 to 2,000 horse-power for a distance of seven miles.

As water wheels give sufficiently uniform

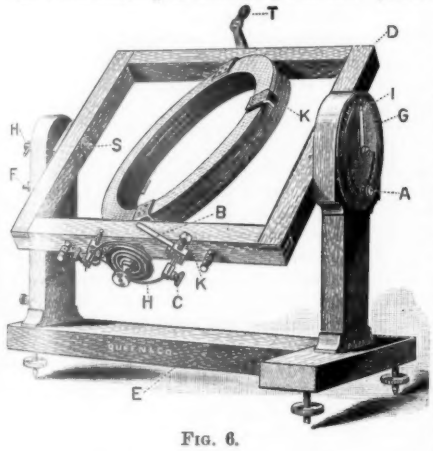


FIG. 6.

speed for looms, and as motors do give a more uniform speed, there is but little question as to their mechanical suitability for such work.

The third class of applications for electric motors is in connection with long distance transmission of power, for the purpose of bringing the energy of a water privilege to a locality more convenient for manufacturing.

The problems of short distance transmission already considered are as different from those involved in the transmission for a long distance, as river navigation differs from that on the ocean, and the extent to which these long distance problems have been mastered was shown by the transmission of 300 horse-power 109 miles through No. 6 wire, at the Frankfort Exhibition, in Germany, last year. There are power transmissions in California for mining machinery for long distances, some of them being 27 miles, but I am not aware that any such great distance has been applied for driving textile machinery.

The electric lighting and power used in Hartford, Conn., is derived in part from a water power at Tariffville, 10 miles away, and some 300 horse-power is transmitted along the wire that distance, and thence distributed to customers around the city.

The Nonotuck Silk Company is supplying to its mills at Leeds and Haydenville, power transmitted by electricity from a dam in a rocky gorge in the river, about a third of a mile from one mill, and a mile and three-quarters from the other.

The installation is not cited as being on a large scale, but because it contains many ingenious features in the manner in which the motors are applied as an auxiliary and a regulator to the water wheels.

The fall of 30 feet is situated between steep banks, where it would not be developed under ordinary conditions, because the spot is unsuitable for the location of a mill.

There are two water wheels in use, one of 90 horse-power, driving dynamos which furnish 950 incandescent lamps on an alternating system at the mills. The other 130 horse-power water wheel drives one Thomson-Houston generator of 85 horse-power and another of 30 horse-power, the pressure of the current being the same as that used on trolley street cars. At the mills one-third of a mile distant is one motor of 45 horse-power, two of 20 horse power and one of 10 horse power, all supplied by electricity from the 85 horse-power generator.

FIG. 1

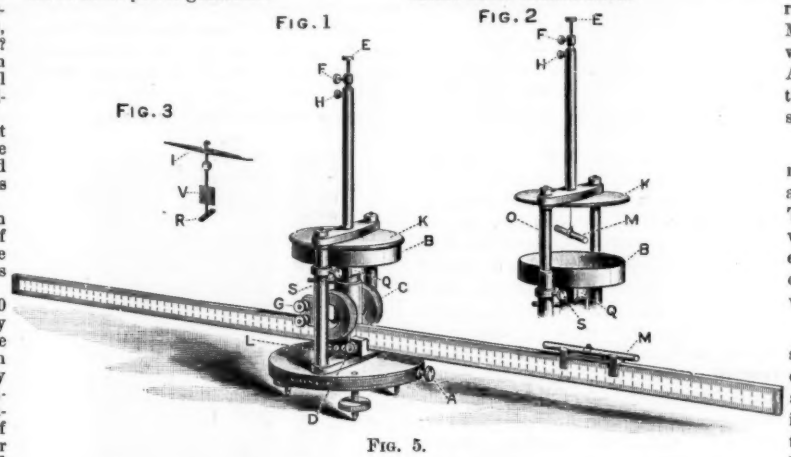


FIG. 2

FIG. 3

FIG. 5.

The 45 horse-power motor belts upon the main shaft, which is driven by two water wheels having a capacity of 100 horse-power under a 12½ feet fall.

The water wheels are run at full gate without any regulator, but the motor serves as a regulator running at uniform speed and furnishing the remainder of the power, which has a variable range of 25 horse-power.

When the water falls too low for the water wheels and motor to run the mill a steam engine is belted to the main shaft, the motor and water wheels furnishing their full capacity, and under these conditions the engine regulates the speed of the whole. It is an important precaution to set the governor on the engine for a speed slightly greater than its proportion to the motor and water wheels, so that it will lead and also prevent the motor from tending to do more than its proper capacity.

The other three motors are used to drive the machinery in an adjoining mill building, and they are connected directly to the shafting, one in each room.

The 50 horse-power generator at the power station operates a 45 horse-power motor in the mill at Haydenville, a mile and three-quarters distant.

The arrangement of motor, turbines and engine is the same as at the lower factory, but placed in a more compact manner. Arrangements are being made for an increase of this electric plant, and Mr. Ira Dimoch, the managing director, sends me word that he will be pleased to show this electric power installation to any textile manufacturers.

For long distances it is essential to use electricity at high pressure in order to avoid the necessity of using large wires. For this purpose the electricity is generated in alternating pulsations, known as multiphase

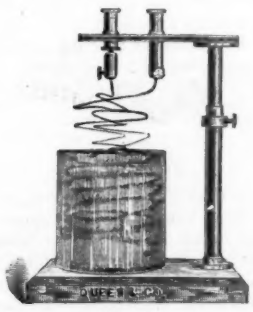


FIG. 7.

currents, at great pressure, and before entering the building where the motors are situated the electrical pressure is reduced by a transformer and in that condition used by the motors.

Mr. Nikola Tesla, of the Westinghouse Company, is the inventor of this type of motors, which have been in practical use for some time in the shops of the Westinghouse Company at Pittsburgh.

It is this type of multiphase machines which offers the only feasible means for transmission over distances exceeding a very few miles, without such undue losses as to be out of the question.

These motors, being free from commutators or brushes, do not spark, are very compact, and start easily under a full load. Motors using multiphase currents are under construction by the General Electric Company.

There are several places in New England where the power of waterfalls is being applied through electrical apparatus to machinery at a distance, and there are numerous extensive enterprises of this nature under consideration.

The electric transmission of power under any practicable conditions of constant or variable speed at a loss not exceeding 20 per cent. has been shown to be entirely practicable, and the open question in regard to all of these devices, whatever may be their purpose, is but the question of cost.

It was my privilege at a meeting of this Association held ten years ago to present a paper on the subject of "Electric Lighting in Mills." The applications of electric illumination have grown during these ten years to such an extent that the daily manufacture of incandescent lamps in this country is now three times the whole number of incandescent lamps then in use in the United States, and I believe that there is no

FIG. 8.

reason to question why there will not be in this decade a comparable increase in the applications of electricity to the transmission of power.

LITERARY.

Scribner's Magazine for November contains the second of its group of preliminary articles on "The World's Fair," this one being an account of "Chicago's Part in the World's Fair," by Franklin MacVeagh, one of the prominent citizens of Chicago, who writes about the enterprise without any bias, frankly stating that he "has no connection with the World's Fair management." His account of what Chicago has accomplished is a wonderful record of enterprise and successful achievement.

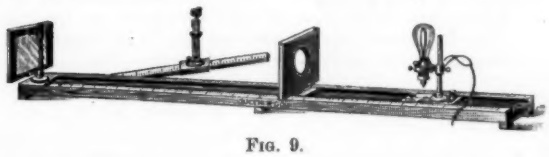


FIG. 9.

"ENGINEERS' POCKET BOOK," Spon & Chamberlain, 12 Cortlandt street, New York. Price, 40 cents.

This convenient little book, which may be readily carried in the vest pocket, is now in its eleventh edition. It contains 135 pages of data useful to mechanical engineers; much that will prove serviceable to engineers or mechanics generally. For example, tables of weights, bulk and strength of various materials used in the arts; rules of mensuration; memoranda relating to farm labor, hydraulics, tables of natural sines and tangents, and tables of weights and measures.

ELECTRIC RAILWAY AND POWER NOTES.

A franchise has been granted for the construction of an electric railway through the principal streets of Sacramento, Cal., and the power is to be furnished from the works at the State prison at Folsom. A dam has been built in the American River at that place.

A scheme is on foot to build an electric railroad from Port Washington through Manhasset to Great Neck, where connection will be made with the Long Island Railroad. At present Port Washington's only connection with the outside world is by lumbering stage coach.

Work on the electric road which is to connect Chicago and St. Louis was formally inaugurated at Edinburg last Thursday. Thousands of spectators were present, who watched every step in the programme with eager interest. The first earth was thrown out by little Alice Adams, after which the work began in earnest.

The Inter-State Consolidated Rapid Transit Railway Company, which operates an elevated steam railway in Kansas City, Kan., and part of Kansas City, Mo., is changing its motive power to electricity, using the trolley system. The company's cable feeder line, running from the business part of Kansas City, Mo., to the eastern terminus of the elevated road, has already been changed to an electric road. The work of erecting poles and stringing wires along the elevated road goes steadily on.

The power plant at the World's Fair is to be made up of all the principal American makes of boilers, engines and dynamos, the units being of all sizes up to 1,000 horse-power. While such a plant is a necessity to the Exposition, the idea has been at the same time to show as many different types of machinery as possible in actual operation, and manufacturers have been only too glad to take advantage of this opportunity to display their apparatus. The designs call for the delivery of over 30,000 horse-power in steam, which gives some idea of the size of this power distribution station.

An exhibition of Councilman E. H. Brown's system of electric propulsion for street cars has been given in North Salem, Mass., to a party of newspaper men. The system is known as the underground or closed conduit system. The peculiarity of the system is in the application of current in such a way as to leave the entire line dead, except that immediately beneath the car. A center track, with eight foot iron rails laid at intervals of eight feet, carries beneath it the feed wire. Beneath each iron rail is a plate in a hermetically sealed box attached to the feed wire. Two electromagnets beneath the car on passing over this raises this plate and completes the connection, thus causing the rail above to become alive, the current passing through the motor, the return being through the rails. The system worked satisfactorily on the model shown.

There is on foot a plan for the consolidation of all the electric railway companies in the Connecticut Valley, and thus join four cities in one system of road, with branches to the suburbs of each city. The plan has originated in the mind of one of the street railway managers, and he has corresponded with the managers of the other roads. It is favorably considered by all, as it is felt that it is only a question of time when the connection will be brought about. The scheme is to build the section of track needed to join Chicopee and Holyoke, and then extend the line up the river to Northampton. The suburbs would then be reached by branches. For instance, Westfield and Thompsonville would be connected from Springfield, South Hadley could be reached from Holyoke, and Amherst and Easthampton from Northampton, with a proposed line to Williamsburg when the travel shall warrant it.

Observations on the Use of Bronze Wire in Telegraphy.

The *Journal Telegraphique*, published at Berne, September 25, 1892, has an important paper written by Mr. Ed. Buels, in which he gives the results of experiments made by him relating to the use of bronze wire for telegraphic and telephonic purposes.

In the introduction it is pointed out that Belgium, though, comparatively speaking, possessing no long distance lines, serves as the connecting link for most of those of Europe, and that consequently it is of the utmost importance that such lines should be constructed of the best possible material.

Observation disclosed the fact that the use of bronze wire brought on certain unexplainable troubles, especially on lines Nos. 35 and 37, which serve for telegraphic intercommunication (Hughes system) between Brussels and Berlin. Almost invariably it would happen towards the middle of the day that the telegraphic signals sent over No. 35 were reproduced on No. 37, and, as this disturbance occurred at a time when the traffic is exceedingly heavy, the result became very annoying to the telegraph administration of Belgium.

An exhaustive insulation test was ordered, but the insulation of the single conductors was absolutely faultless. Under these circumstances, if there were no leakage from one line to the other, inductive effects would seem to offer the most plausible explanation of the mischief. On carefully insulating the line, and employing two sensitive and reliable Hughes instruments, it was perceived that whenever the instruments were used, either as transmitter or receiver, the inductive effects reappeared. Thus the question arose: "Is the phenomenon peculiar to bronze wire, or is it equally noticeable with iron conductors?" As a matter of course, iron being a magnetic material, self-induction takes place, prolonging the time of charge and opposing the propagation of electricity, thus causing the current to rise gradually to its maximum effect. In other words, iron, *per se*, produces the same effect which Van Rysselberghe has attempted to bring about *artificially* in his system of simultaneous telegraphy and telephony, *i. e.*, the graduation of the sending or outgoing current.

Employing bronze wire, self-induction is very slight. The current, suddenly launched upon the conductor, propagates itself rapidly thus producing a secondary current in the neighboring wire of great intensity, as this conductor does not impede the propagation of the secondary or induced current. Were the adjacent wire of iron instead of bronze, the effect of the induced current would scarcely have been noticeable, for its inherent self-induction is quite an obstacle to the rapid propagation of the induced charge. This does not mean that self-induction between iron wires does not exist, but, operating with Hughes instruments over iron conductors, the effect of induction is practically *nil*.

Next, using a Hughes apparatus, it was attempted to measure the strength of the induced current. Omitting here the details, it may be stated that the strength of the induced current amounted to 8.33 milliamperes.

This point being elucidated, the following important questions were tested by actual experiments:

1. The conductors 35 and 47 constitute a telephone circuit. Is it reasonable to assume that the reproduction of signals is due to leakage through the condensers which separate the conductors?

2. Admitting that the phenomenon observed with bronze wires is favored by the rapid and not graduated current, is it increased by the suppression of the anti-induction devices of Van Rysselberghe?

An examination of this point was thought to be of great value because this opinion, *i. e.*, that self-induction between bronze wires used for telephonic service should be charged to the presence of the anti-induction apparatus of Van Rysselberghe, has been frequently heard in European countries.

Upon breaking the connection between the conductors and the condensers, induction, although perhaps a little less pronounced, yet remained quite noticeable. It should be borne in mind that the conductors 35 and 47 had been insulated at the frontier, and that consequently the condensers, connected in derived circuit, took their maximum charge. With the conductors constituting a metallic circuit, the leakage through the condensers would have been imperceptible for all practical purposes.

As to the second point, it was shown that self-induction increased noticeably with the cutting out of the anti-induction apparatus, in other words, when the conductors were used exclusively for telegraphic purposes. Frequent experiments have corroborated these results.

As the experimental lines were comparatively short, a set of tests over long distance lines seemed advisable. Brussels and Paris are connected by two metallic circuits of bronze wire (three mm. diameter, their length being 315 and 360 kilometres, respectively). These lines serve for telegraphic service during exchange hours, but on account of interference of signals it had been impossible to use both of these lines simultaneously with Hughes' apparatus. By the courtesy of the French telegraph administration tests were made upon these lines. As Fig. 1 is self-explanatory of the method employed, only the results need be stated.

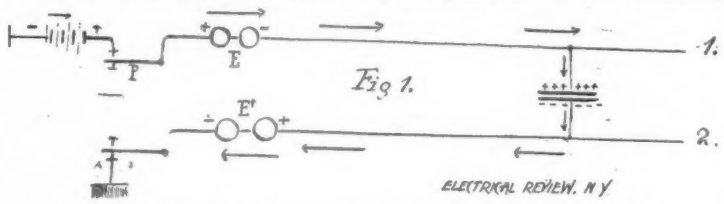
Suppressing the anti-induction apparatus at the transmitting end of the line, the induced current increased rapidly in No. 2, making it impossible to use the receiving instrument. This showed conclusively that by suppressing the anti-induction apparatus at the sending end of the line the induction violently increased.

By cutting out the anti-induction devices at Brussels, the induction observed at Paris increased in the proportion of 5–6.

The conclusion drawn from these experiments is that the Van Rysselberghe anti-induction apparatus, instead of causing induction between bronze wires, materially helps to suppress the same, while at the same time it assists the working of the Hughes apparatus over these lines.

Again, the self-induction of iron wires, so often decried as injurious, may yet become a boon for long-distance telegraph lines constructed of bronze wire and intended to be operated by Hughes' apparatus; in fact, Van Rysselberghe's electric graduators, if used with bronze wires, serving telegraphic purposes, produce the self-induction which is needed for the successful working of the line.

Finally, it was attempted to solve the problem whether or not the observed phenomenon should be ascribed to static or dynamic induction. The conclusion reached by the experimenter may be expressed in the following words: On open circuit, static induction, on closing the circuit, dynamic induction plays the principal part.



OBSERVATIONS ON THE USE OF BRONZE WIRE IN TELEGRAPHY.

Recent Fires.

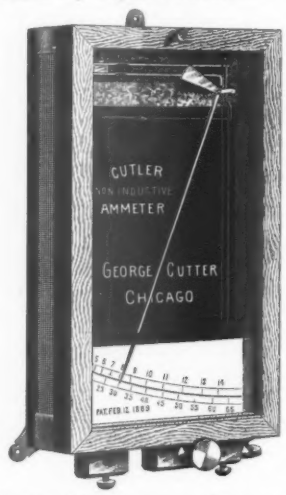
The electric light plant at Cleburne, Tex., was destroyed by fire on October 26. It is supposed that hot cinders set fire to the floor, which was saturated with oil. The estimated loss is about $6,000.

The plant of the Haverford Electric Light Company, at Haverford, Pa., was burned October 31, with the company's stable and another adjoining stable. The Electric Light Company loses $25,000; insurance $10,000.

The power plant of the Beatrice, Neb., Rapid Transit and Power Company was destroyed by fire on October 30; cause unknown. Loss estimated at $10,000; insurance $8,000.

The Cutler Non-Inductive Ammeter.

All of the ammeters on the market with, perhaps, a single exception, depend on magnets for their action, so that their readings are largely influenced by the presence of iron masses near by. In a station where there has to be so much heavy machinery, this factor often spoils all dependence on the readings. And even if the instruments are placed at a distance from the dynamo and engine room, two of them placed side by side may affect each other's readings. These are a few of the reasons why an ammeter having no magnets ought to be more reliable and better adapted to central station work than any magnetic instruments.



CUTLER NON-INDUCTIVE AMMETER.

The non-inductive ammeters devised by Mr. H. H. Cutler depend on the difference in expansion of two fine wires, one of which is traversed by the current to be measured, while the other compensates for changes in temperature of the room. The two wires are fixed at one end and are kept taut by flat springs carrying two knife edges. A yoke resting on these bearings carries a light pointer, the leverage being such that quite a small expansion of the measuring wire will move the needle across the scale. The instrument is practically dead-beat, and could be set on the pole-piece of a dynamo without affecting its readings.

The cut on this page illustrates an ammeter made with a double scale to read up to 65 amperes, the scale being much longer than in most instruments of this kind. This ammeter is equally accurate on direct or alternating circuits, and steady use for the past six months has shown it to meet the needs of central station practice. It is built in sizes ranging up to 160 amperes to meet the varied requirements of different stations, and the maker, George Cutter, of Chicago, is finding quite a demand for it.

Fluoride.

The American Fluoride Company, of 126 Liberty street, New York, are putting a new compound on the market for purifying the water and removing scales from boilers, from which they confidently look for big results. It is a chemical preparation, patented by Prof. Chas. A. Doremus, of New York, and it is claimed has many advantages over anything of the kind now in use. In the first place, it is a dry crystalline powder, containing no acid or fatty matter nor any chemical that will in any way injure iron or steel, and is not harmful to handle. The small quantity necessary is another advantage, and the saving in freight and cost of handling is very considerable. Leading engineers in this country and in England have recommended it strongly, and tests on a large scale have proved more than satisfactory.

Electric Torpedo Boats.

The torpedo boat is one of the weapons upon which we are to rely in the next great naval war, and men-of-war are provided with second-class torpedo boats, which are to be hoisted out and detached when occasion arises. It is obvious that one of the great requirements for boats built for this service is that they should be always ready for work. With a steam launch some delay must be incurred in raising full pressure of steam, even if the launch boiler be fed with live steam from the main boilers. The electric torpedo boat can be charged from the dynamo, which is now a necessary part of every steamship's outfit, during times when there is slackness in the demand for steam and when few lamps are switched on.

The cost of charging is, therefore, reduced to a minimum, but this recommendation is one of the least important, because in estimates for war purposes economy is a very secondary consideration. The great recommendation is that she is always ready. Once charged she remains on duty, and when the call comes she has to be put afloat and the starting lever put over. She is thus enabled to go full speed ahead on touching the water, and this is a very great consideration. The difficulty at present in the way is that of speed. The data available to the public respecting small steam vessels is very meagre. We can easily find out particulars of the engines, consumption and bunker capacity of ocean steamships, although sometimes the figures are more approximative; but the builders of little boats keep the particulars of weight of machinery and amount of consumption of coal very much to themselves. Then, too, the electric launches hitherto built have not gone in for great speed.

Those built for Thames pleasure purposes, for example, are very much limited in speed by the rules of the Thames Conservancy, and the builders of craft for this traffic are, therefore, obliged to find an outlet for their ingenuity by trying to decrease the weight of their machinery and increasing the length of time during which a vessel may be run before her charge is exhausted. Thus at present we cannot pretend to give any accurate details regarding the weight of the electric machinery required to drive a second-class torpedo boat at the speed where her steam engines now take her. This, however, seems certain, she could be driven at her present speed in the present state of electrical science, though her endurance would be less with electricity than with steam. This is, of course, a disadvantage, but it must be remembered that in an attack by a boat of this kind, detached from a man-of-war, the time during which she would be required to be under way would be very short.

The attack would probably consist of a rush forward and a rapid retreat to the shelter of her convoy. Against this disadvantage must be placed the constant readiness to which we have already alluded, and also another advantage, which is of scarcely less importance, viz., the absence of smoke and glare. During the recent naval manœuvres it was a constant complaint that when pressed to full speed a flame appeared above the funnels of the torpedo boats in spite of all efforts to prevent it, and that this, of course, gave fatal indication of their whereabouts. The whole value of an attack could be lost if such a warning were given in actual warfare, and the electric launch could give no such sign. The Liverpool Journal of Commerce understands that data as to the endurance of electrically propelled torpedo boats will soon be available.

The Baltimore Traction Company is reported to have acquired by purchase the City and Suburban Railway, of Baltimore, which was formerly known as the Union Line. The price paid is said to have been $1,700,000, the purchase securing to the Baltimore Traction Company the entire issue of capital stock of the City and Suburban Company. It is unofficially stated that the Baltimore Traction Company will increase its capital stock from $5,000,000 to $7,000,000, the proceeds to be used in improving the newly acquired system, which has an extensive mileage of road, and is to be hereafter operated as a trolley line, instead of by horses.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

PIQUA, O.—An application has been filed with the Secretary of State, for an incorporation to construct an electric railway between this city and Troy. The incorporators are, W. P. Orr, L. M. Flesh, W. T. Steiner and W. F. Orr.

LANSING, MICH.—The Lansing City Electrical Railway Company has been organized with a capital of $100,000, and the following officers elected: Gordon MacDonald, of New York, president; C. H. Osband, of Lansing, vice-president, and A. G. King, of Lansing, manager. The company has purchased from the Continental Trust Company the franchise of the Lansing Electrical Street Railway Company, and will operate the road.

ROCKLAND, ME.—The cars of the Rockland & Camden Street Railway Company will be heated by electricity.

FLATBUSH, L. I.—The Town Board of Flatbush has decided to grant a franchise to any company to operate a trolley on Nostrand avenue, providing they guarantee a five-cent fare to the ferry.

PHILADELPHIA, PA.—The Bill, permitting the Holmesburg, Tacony and Frankford Electric Railway Company to use electric motors has passed the city council.

MIDDLETOWN, N. Y.—A stock company, with a capital of $100,000, is being organized by C. M. Winchester, for the purpose of owning and operating an electric street railway in this city.

SCRANTON, PA.—The Valley Passenger Railway Company; capital stock, $200,000. The proposed road will be 26 miles in length and will extend from Archbald to Scranton, Pittston and Hughestown. The directors are, August Robinson, John J. Fahey, Joseph O'Brien and M. W. Collins.

ATLANTA, GA.—The Atlanta & East Lake Electric Car Line Company has been formed to build a new street railway. The franchise has been granted by the council. Henry Lanier is promoting the scheme.

ANN ARBOR, MICH.—S. Dean and others secured a bill enjoining the Ann Arbor Street Railway Company from constructing an electric line in Packard street. Upon hearing in the Circuit Court the bill was dismissed, and the Supreme Court now affirms such action.

BEATRICE, NEB.—The old horse car line has been purchased by the Rapid Transit Company, which will equip it electrically.

SACRAMENTO, CAL.—Albert Gallatin and H. P. Livermore have filed a $25,000 bond for the construction of a new electric railway, to be completed in one year.

WASHINGTON, PA.—Amos Townsend, representing a number of Pittsburgh capitalists, is in this city endeavoring to interest the monied men in a gigantic scheme to connect Brownsville and intermediate points with Washington by an electric railway. The proposed route is along the national pike and is 24 miles in length. The intention is to cater not only to the passenger traffic, but also the freight and produce trade. The movement is looked upon with favor by the citizens of this place, and will doubtless be a "go."

HORNELLSVILLE, N. Y.—The contract for building an electric railway between this city and Canisteo has been awarded to an Elmira firm. Work will be commenced at once.

PHILADELPHIA, PA.—The Hyde Park Railway Company; capital stock, $50,000. John P. Issley, President. The company will operate in Lackawanna County.

BRIDGETON, N. J.—There is every indication that this city will have electric street cars at an early date. A Philadelphia corporation has had its representative here on several occasions, and the council has been assured that the road would be built inside of a year.

NEW HAVEN, CONN.—The Winchester Avenue Railway Company has purchased the New Haven and West Haven Street Railway. The Winchester Avenue Company will now petition the Legislature for authority to use electricity.

ST. LOUIS, MO.—The Edison Illuminating Company; capital, $5,000. Incorporators, J. J. Tausig, August Gehner and P. J. Doerr.

HYNDMAN, PA.—The Hyndman Electric Light, Heat and Power Company; capital, $15,000. Geo. M. Hoblitzell, president; F. W. Hoblitzell, secretary; John K. White, treasurer.

NATICK, MASS.—Eliot Falls Electric Light Company; capital, $30,000. Promoters, Albert D. Richards, Arthur E. Appleyard, Samuel Singer.

SEDALIA, MO.—Mount Tobo Water, Light and Power Company; capital, $30,000. Promoters, M. L. Andrews, S. F. Rosse, D. E. Kennedy.

GRANGEVILLE, IDAHO.—The Grangeville Mill and Power Company, Limited; capital, $5,000. Promoters, J. P. Volum and Wallace Scott.

LOCKPORT, N. Y.—George T. Cluster, whose extensive flouring mills in this city were recently destroyed by fire, has decided not to rebuild the plant, but will establish an electric light and power plant instead. He is investigating the merits of the various systems and will soon be prepared to furnish power to manufacturers and lights for private and public use.

AFRAID TO INHALE IT.

DOCTOR—"Why, are you going to leave simply because you have to talk through the telephone?"

BRIDGET—"Av coorse Oi am. Oi don't want t' be inhalin' th' breath av thim different people all th' toime, begob!"—*Judge.*

SHERIDAN, WYO.—Application has been made to the town Council for a street railway franchise.

Electric Light and Power.

GRAND RIDGE, ILL.—The Grand Ridge Electric Light, Power and Creamery Company; capital, $8,000. Incorporators, J. S. Lewis, C. A. Porter and Reuben Eckert.

LEXINGTON, VA.—A syndicate of Baltimore capitalists, consisting of Lester H. Latham, Robert E. Hulton and John C. Powell, have purchased from Waddell and Shelton a franchise for lighting this town by electricity. They have organized the Lexington Electric Light and Power Company and have elected Lester H. Latham, president.

EDWARDSVILLE, ILL.—The Edwardsville Electric Light and Power Company; capital, $20,000. Incorporators, Wm. Wurdack, Chas. P. Lampel and Wm. A. Horine.

PEORIA, ILL.—E. B. Hillman, L. B. Bradley and H. T. Hays have incorporated the Farmington Electric Light and Power Company; capital, $12,000.

NEWARK, OHIO.—A new incandescent light company, to be known as the Newark and Granville Electric Light Company, has been formed. F. Crane is one of the principal stockholders.

CHICAGO, ILL.—The Chicago Power and Heat Company; capital, $10,000,000. Incorporators, Jas. B. Gascoigne, Daniel H. Donovan and H. G. Colson.

MERCHANTVILLE, N. J.—The Merchantville Light, Heat and Power Company has been incorporated, with a capital stock of $50,000, for the purpose of manufacturing and selling gas and electricity. The incorporators are Alex. G. Cattell, George W. Gilbert, Ed. S. Hall and R. H. McNeal.

HAVERFORD, PA.—The plant of the Haverford Electric Light Company has been burned. Loss, $25,000; insurance, $10,000.

BALTIMORE, MD.—The City and Suburban Railway Company will build a $500,000 power plant.

OCONOMOWOC, WIS.—Oconomowoc Electric Lighting Company; capital, $30,000. Promoters, G. L. Wilsey, W. Parks, J. L. Wilsey.

RICO, COLO.—The Colorado Electric Light and Power Company; capital, $50,000. Promoters, E. N. Freeman, L. Habermann, W. W. Parshall.

DANVERS, MASS.—A corporation known as the Danvers Electric Light and Power Company is soon to be formed in town, with a capital of $25,000. This company is to be organized for the purpose of providing electric light and power to the citizens. J. C. R. Peabody, of Sylvan street, is at the head of the movement, and it is said that several well-known citizens of the town are associated with him in the scheme. The company will erect a power house in town, which will be equipped with all the necessary machinery for the performance of the work, and it is also stated that the new company will furnish electricity for the Lynn & Boston Street Railroad Company for the running of their cars in this town.

EDWARDSVILLE, ILL.—Edwardsville Electric Light and Power Company; capital, $20,000. Incorporators, William Wurdock, Charles P. Lampel and Wm. H. Horne, Sr.

New Manufacturing Companies.

PORTLAND, ME.—The Shawmut Fuse Wire Company; capital, $25,000. Loring A. Chase, president, and Russell Robbs, treasurer, both of Boston. The object of the company is to manufacture fuse wire, mechanical and electrical devices.

CAMDEN, N. J.—The United Columbian Electric Company; capital, $800,000. Promoters, A. G. Hetherington, Chas. W. Kennedy, Marcus B. Taylor and Henry Groswith.

ST. LOUIS, MO.—D. H. Nichols, ex-general superintendent of the San Francisco and New York & New England Railroads, has figured out a plan by which cars can be lighted by electricity which is generated by the wheels of the engine and cars. A company has been organized to manufacture such cars, and the Old Colony Railroad Company has decided to adopt the plan.

Increase of Capital Stock.

CHICAGO, ILL.—The Northwestern Electric Light and Power Company has increased its capital from $25,000 to $50,000.

NEW YORK, N. Y.—Capital of the Consolidated Electric Storage Company has been increased from $1,000,000 to $3,000,000.

Telephone and Telegraph Companies.

CHICAGO, ILL.—Articles of incorporation have been issued to the Browne Telephone and Telegraph Company; capital, $5,000,000. The object is to manufacture and sell the Browne telephone, recently patented. It will be distinctively known as the long distance telephone. The patentee and the incorporators of the company claim that persons can talk 3,000 miles apart, and be heard as distinctly as though but a block apart.

Electric Light in Japan.

"I represent the Osaka Electric Light Company," said Kunihiko Iwadere, of Japan, to a San Francisco *Call* reporter.

"The United States is the seat of learning for all matters connected with electric invention.

"That is why I have returned here to study the latest electrical improvements in all branches, including mining industries.

"I studied originally in the Edison works at New York and Schenectady before I returned to take charge of our plant in Japan.

"Ours is purely a Japanese company, controlled and owned by Japanese in Osaka, which is the next town in importance to Tokio in Japan.

"We have 8,000 lights set up in Japanese homes and the next year will put up another 1,000. We have also 100 arc lights distributed in arsenal works and factories.

"The electric light is in great demand among the Japanese. Twelve large companies are doing big business there.

"We always look to the United States as our training school, though.

"Europe can teach us nothing we do not know in that respect, but you can, and we gladly avail ourselves of your inventive genius.

"When the House of Representatives was burned down in Tokio the cause of the fire could not be traced. Some old fogies declared it was caused by an electric wire, and the Emperor was persuaded not to use electric lights in the palace.

"The new House of Representatives, however, has been relighted with electricity, and next year the Emperor, having paid due deference to the opinion of his advisers, will now use his own discretion and the imperial palaces will be lit by electricity.

"I shall be here eight months or so studying all your latest improvements in this line."

KINDRED INTERESTS

The Westinghouse Electric and Manufacturing Company has recently sent out three handsome and useful pamphlets entitled, "Armatures," "Electric Railway Apparatus" and "Testimonials Regarding Railway Apparatus."

The Brush Electric Company have just completed the installation of a 30-arc light plant at the factory of Benedict & Burnham, Waterbury, Conn., and a 60,000 watt Brush alternating plant at Cornwall-on-Hudson, N. Y., both of which plants were recently sold by Mr. A. D. Dorman, of the New York office of the Brush Company.

The Burton Electric Company, Richmond, Va., manufacturers of the Burton electric heater, have appointed Messrs. Taylor, Goodhue & Ames, of Chicago, their general agents. This company reports that it is daily receiving orders for Burton heaters from the Northern, Eastern and Western States. One recent order was for 16 heaters, which went to a street railway company in Iowa. The indications are that the Burton electric heater is proving a general favorite and is coming into very general use.

The Ball Engine Company, of Erie, Pa., have made the following recent shipments: General Electric Company, Atlanta, Ga., one 150 horse-power engine; Lake Shore Iron Works, Marquette, Mich., one 60; Risdon Iron Works, San Francisco, Cal., one 25; Badenoch Bros., Englewood, Ill., one 600; Calvert Building and Construction Co., Baltimore, Md., one 80, one 130 and one 35; Excelsior Electric Co., Port Huron, Mich., one 400; F. R. Dravo & Co., Pittsburgh, Pa., two 80, one 100 and two 25; Crook, Horner & Co., Baltimore, Md., two 80 and one 60; J. H. Kuehling, Washington, D. C., one 60; Risdon Iron Works, San Francisco, Cal., one 150; General Electric Co., New York city, two 100.

SITUATION WANTED

In Office or Factory, willing to travel, thoroughly conversant with all the branches of the Insulated Wire and Cable business.

Address under,

"EXPERT,"

Care of ELECTRICAL REVIEW,

13 Park Row, NEW YORK.

FOR SALE CHEAP.

Two dynamos, 1,500 amperes each, one smaller dynamo, 500 amperes, suitable for metallurgical work.

Also for sale or rent, a five acre lot, fronting two railroads, with suitable buildings for manufacturing, with 80 horse-power boiler and 65 horse-power Westinghouse engine, pulleys, belting, etc., all new and plenty of water on property.

Apply to A. T. PICKERT,

ATLANTA, GA.

NOTICE TO ELECTRICAL CONTRACTORS

All Electric Construction Companies and Contractors installing work in the States of Pennsylvania, New Jersey, Maryland, Delaware and District of Columbia, are requested to write for agreement form for such work to the **Secretary of Underwriters' Association of the Middle Department, 316 Walnut Street, Philadelphia.**

RECEIVER'S SALE.—In pursuance of an order of the Court of Common Pleas, for the City and County of New York, made on the 30th day of September, 1892, I, the undersigned, the Receiver of the Crosby Electric Company, will sell at Public Auction, by Haydock & Bissell, public auctioneers, at 15 Park Place, in the City of New York, on the 12th day of November, 1892, at 10:30 o'clock in the forenoon, a lot of Electrical Supplies and Merchandise consisting of Dry Batteries, Zinc Cups, Carbons, Jars and Connections, one Surgeon's Cabinet, etc., etc. Catalogue at sale, or of Receiver.

EDO. E. MERCELIS,
Receiver Crosby Electric Co.,
69 Wall St., N. Y.

Dated NEW YORK, October 18th, 1892.

STILL FURTHER IMPROVEMENTS

—IN—

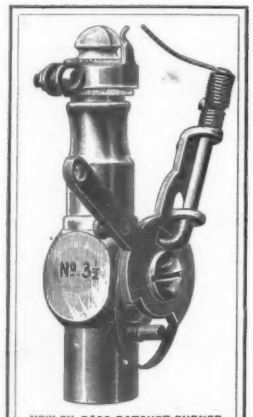
ELECTRIC HAND-LIGHTING . . . GAS BURNERS . . .

The By-Pass Ratchet Burner No. 3½

. . . . . WE HAVE RECENTLY PRODUCED THIS IMPROVED RATCHET GAS BURNER, WHICH WE TAKE PLEASURE IN OFFERING THE ELECTRIC HOUSE-FITTING TRADE FOR EXAMINATION AND TRIAL.

FIRST..... **Only one contact is made** in four operations of the movable arm forward and back **to light and extinguish the gas.**

SECOND. This not only saves fifty per cent of the battery power, **but preserves the wipe spring from heat and smoke,** and so prevents grounds at the **contact points, which are** always kept clean.



NEW BY-PASS RATCHET BURNER
No. 3½.
CUT FULL SIZE.
Pat. Mar. 2, 1880, and April 2, 1889.

THIRD.... The No. 3½ is smaller than the bulb Ratchet burner, but has an amply large gas-way, into which is inserted a **perfect working gas-check, which prevents hissing.**

FOURTH. It will interest users to find a ratchet hand-lighter whose movable electrode cannot be held in the flame until softened and robbed of its tension. Please note that the electrode is **not** lifted over the fixed one **through the flame,** but passes under and **out of the flame** instead.

THE NEW BY-PASS RATCHET BURNER is an improvement upon, and is designed to take the place of, our old Nos. 7 and 11, and we feel sure it will not fail to give the greatest satisfaction to users.

Our Gas-lighting Apparatus is popularly known to be thoroughly constructed after the most practical and popular designs, and nicely finished in all required styles.

This New Burner is offered at the same prices as our popular No. 3 Bulb Burner. We cordially invite correspondence from electrical house fitters and contractors everywhere. Address

THE ELECTRIC GAS LIGHTING CO.

BOSTON, Nov. 2, 1892. 195 DEVONSHIRE ST., BOSTON, MASS

Hulbert & Schmidt Mfg. Co. St. Louis, Mo.
Artistic Metal Workers
Brass, Iron and Wire Office-work.
Railings, Gratings, Mettings, etc.
Everlasting Cemetery FENCES.
Shipped everywhere. Agents wanted.
Write for Catalogue and Estimate.

G. E. HORN & CO.,

Manufacturers and Jobbers of

ELECTRIC BELLS,

63 So. Canal St., Chicago, Ill., U. S. A.

SHALL WE SEND YOU OUR ILLUSTRATED PRICE LIST?

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Insulating Compounds,
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Insulating Tapes,
Compounds for all kinds of iron work

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FOR

Direct Currents.

It pays in the end to place first class ammeters and voltmeters on light and power switchboards. We can convince you of this fact. Send for descriptive circular No. 330, and try the "Magnetic Vane" type, which is our specialty.

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PHILADELPHIA.